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Biological Society of Washington

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The Committee on Publications declares that each paper of this volume was distributed on the date indicated on its initial page (except those dated October 26, which actually should be dated October 30). The contents, minutes of meetings, and index for 1933 (pp. v-x; 217-222) were issued on February 9, 1934. The title page and list of officers and committees for 1933-1934 were issued on June 30, 1933.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets from October to May, on alternate Saturdays, at 8 P. M. All meetings during 1933 were held in the new lecture hall of the Cosmos Club.

January 7, 1933—783d Meeting.

Vice-President Chambliss in the chair; 60 persons present.

Informal communications: F. Thone, Exhibition of a new biological publication; T. Ulke, Biographical notice of Ewing Summers.

Formal communications: A. B. Clawson, Bitter rubberweed—a new poisonous plant problem of the Southwest; S. F. Hildebrand, Unusual fishes.

January 21, 1933—784th Meeting.

President Jackson in the chair; 52 persons present.

New member elected: C. W. Tolle.

Informal communications: T. Ulke, Exhibition of photographs of American naturalists.

Formal communications: C. O. Erlanson, In quest of the potato and its relatives in South America; C. W. Cooke, A possible geological cause of the Mayan migration.

February 4, 1933—785th Meeting.

President Jackson in the chair; 45 persons present.

New members elected: F. R. Fish, R. N. Saxton.

Informal communication: F. Thone, Exhibition of new books.

Formal communications: R. R. Spencer, Rocky Mountain spotted fever; J. E. Shillinger, Diseases of animal life.

February 18, 1933—786th Meeting

President Jackson in the chair; 70 persons present.

Informal communication: A. A. Doolittle, Exhibition of sealed jars containing growing plants.

Formal communications: H. C. Bryant, Biological phases of certain National Park projects; F. C. Bishopp, Home life of the mosquito and mosquito control.

March 18, 1933—787th Meeting.

President Jackson in the chair; 52 persons present.

Informal communications: F. Thone, Exhibition of new biological books; T. S. Palmer, Sketch of the life of Lord Lilford.

Formal communications: W. H. Sebrell, Recent studies of mottled tooth enamel; V. Bailey, A collecting trip across Mexico.

April 1, 1933—788th Meeting.

President Jackson in the chair; 49 persons present.

New member elected: R. L. Van Dine.

Informal communication: E. P. Walker, Notice of the receipt of two lesser pandas at the National Zoological Park.

Formal communications: F. W. Poos, Leafhooper injury to forage crop legumes; Agnes Chase, A collecting trip across Mexico.

April 15, 1933—789th Meeting.

President Jackson in the chair; 48 persons present.

New members elected: I. M. Cowan, T. L. Marini.

Informal communication: F. C. Lincoln, Records of banded pintail.

Formal communications: F. C. Bishopp and R. E. Dyer, Discussion of ticks and spotted fever; W. H. Larrimer, Parasites of the European corn-borer.

April 29, 1933—790th Meeting.

54th Annual Meeting.

President Jackson in the chair; 18 persons present.

New member elected: J. C. Greenway.

The annual reports of the Recording Secretary, Correspond-

ing Secretary, and Treasurer were presented. Reports were presented for the Board of Trustees of the Permanent Fund, the Committee on Communications, the Committee on Publications, and the Committee on Zoological Nomenclature.

The following officers and members of council were elected:

President, C. E. Chambliss; *Vice-Presidents*, C. W. Stiles, T. E. Snyder, H. C. Fuller, T. H. Kearney; *Recording Secretary*, S. F. Blake; *Corresponding Secretary*, J. S. Wade; *Treasurer*, F. C. Lincoln; *Members of Council*, W. R. Maxon, A. A. Doolittle, I. N. Hoffman, E. P. Walker, J. E. Shillinger.

October 21, 1933—791st Meeting.

President Chambliss in the chair; 190 persons present.

Informal communication: F. Thone, Exhibition of some recent books on biology.

Formal communication: P. Bartsch, Exploring the Atlantic deeps with the Smithsonian-Johnson Expedition.

November 4, 1933—792d Meeting.

President Chambliss in the chair; 55 persons present.

New members elected: W. J. Hamilton, Jr., R. T. Orr.

Informal communications: F. Thone, Exhibition of new biological publications; A. Wetmore, Notice of a red bat struck by an automobile; H. C. Bryant, Note on a hunting season for elk in the Olympic Peninsula.

Formal communications: J. M. Linsdale, the natural history of magpies; George Ruhle, Biological features of Glacier National Park.

November 18, 1933—793d Meeting.

President Chambliss in the chair; 85 persons present.

Informal communication: A. S. Hitchcock, Notice of *Silveus* Grasses of Texas.

Formal communications: H. N. Darton, Geology of the District of Columbia region; R. W. Brown, Fossil plants of the District of Columbia and vicinity; C. W. Gilmore, Fossil animals of the District of Columbia.

December 2, 1933—794th Meeting.

President Chambliss in the chair; 75 persons present.

President Charles E. Chambliss was nominated as Vice-President of the Washington Academy of Sciences.

Informal communications: T. S. Palmer, Notice of the recent meeting of the American Ornithologists' Union; H. C. Oberholser, Effect on waterfowl of several years' drought.

Formal communications: H. C. Bryant, Early bird lists in the United States; Phoebe Knappen, The Washington Monument once again a bird menace; F. C. Lincoln, Restocking waterfowl marshes with hand-reared ducks; J. E. Shillinger, A destructive disease affecting waterfowl.

December 16, 1933—796th Meeting.

President Chambliss in the chair; 85 persons present.

New members elected: H. G. Deignan, G. N. Jones.

Informal communications: F. Thone, Exhibition of recent biological publications; P. B. Johnson, Note on the transport of stones in the roots of trees; Phoebe Knappen, Note on the occurrence of a maple seed in a hawk's wing.

Formal communications: Alvah Godding, Trees indigenous to the District of Columbia and vicinity; R. W. Davidson, Commoner diseases affecting trees in the District of Columbia and vicinity.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF APHIIDAE FROM WESTERN
COLORADO.

BY F. C. HOTTES.

The summers of 1931 and 1932 offered exceptional opportunities to collect aphids on the Western Slope of Colorado, a section of the state not as thoroughly worked by Professors Gillette and Palmer as that more conveniently located for them near Fort Collins, on the eastern side of the mountains. As a result of the two seasons work the new species and hitherto undescribed forms of Aphidae are here described.

Most of the forms described here were collected between Skyway (a summer post-office and supply store, located on the shore of Mesa Lake), and the top of Grand Mesa (a volcanic plateau of some 10,000 feet altitude), upon the top of which four of the species described here were collected. In this region spring comes late and fall puts in its appearance unmistakably early so that the full cycle of events in the family life of an aphid species must of necessity be crowded into two short months.

I would gratefully acknowledge the opinions of Professors Gillette and Palmer and Dr. P. W. Mason to whom certain of these species were sent for study before being definitely considered as new.

In this paper I have chosen to use the generic terms *Dactynotus* and *Adactynus* proposed by Rafinesque for the generic terms *Macrosiphum* and *Myzus*, and I shall continue to do so until the Zoological Congress rules otherwise.

Cinara fornacula Hottes.

STEM MOTHER.

Size and general color.—Average length from vertex to tip of anal plate, 4.49. Entire body slightly pruinose. Head somewhat yellowish or light dusky brown with a rather conspicuous dark median line. Thorax and

abdomen light pea green. Cornicles concolorous with abdomen. Cauda slightly dusky. In mounted specimens small browned wax pore-plates may be seen on the dorsum of the abdomen and thorax. The first antennal segment is concolorous with head at the base but is lighter toward its distal end; the second and third antennal segments are light yellowish in color. The third segment may occasionally be light dusky toward its apex. Fourth, fifth, and sixth antennal segments light dusky with their apical ends darker; the sixth antennal segment is considerably darker than the other segments. Eyes dark brown. Beak with last three segments dark brown, remaining segments considerably lighter in color, apical portion of long segment more or less mottled, or entirely brown. Coxae and femora of all legs light yellowish brown (femora darker towards apex). Tibiae light yellowish-brown with apical portions brown. Tarsi dusky brown.

Head and appendages.—Average width of head across eyes, .90. Antennal segments with the following comparative lengths: III—.57 to .67, average .62; IV—.20 to .24, average .23; V—.24 to .29, average .27; VI—.16 to .20, average .18 plus .04. Secondary sensoria confined to apical half of fifth antennal segment, numbering from 0 to 2, usually 1. Primary sensorium on sixth antennal segment large and rarely with more than three widely scattered marginal sensoria. Hairs on third antennal segment brown; about one-fifth longer than width of segment, considerably longer than this on fourth and fifth antennal segments. The hair on the antennae are fairly straight and leave the segments at an angle of approximately 45°. For the genus, they are comparatively few in number. Compound eyes with ocular tubercles. Beak long, reaching beyond metathoracic coxae.

Thorax and appendages.—Lateral and dorsal portion of thorax with approximately twenty-four wax pore-plates arranged in groups of two, in four, more or less irregular rows, two more or less lateral and two dorsal. All femora with a row of sensoria on their posterior surfaces. Tibiae comparatively straight, hairs on outer surface of tibiae inclined at an angle of 45°, and approximately one-seventh shorter than width of segment. Second segment of tarsus considerably curved and approximately seven times as long as the first tarsal segment.

Abdomen.—Width of base of cornicles approximately .24. Exact width often difficult to determine because of lack of differentiation between cornicles and rest of abdomen. Hairs on base of cornicles of one kind considerably finer in quality than those on remaining portion of abdomen. Lateral and dorsal portions of abdomen with approximately thirty wax pore-plates arranged in four more or less irregular rows, rows on anterior portion of abdomen with more wax pore-plates than those on posterior portion of abdomen. Cauda broadly rounded, approximately five times as wide at the base as long. Hairs on body long and spine-like.

OVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 3.08. Color essentially similar to that of stem mother, but differing in the

following respects: Head lighter in color; antennal segments five and six alone dusky; tibiae almost uniform in color, very slightly if any darker at apex; tarsi brownish at base, dark brown toward apex; tip of abdomen more farinose than remaining portion of abdomen.

Head and appendages.—Average width of head across eyes, .71. Antennal segments with comparative lengths as follows: III—.46 to .53, average .50; IV—.16 to .20, average .185; V—.23 to .29, average .255; VI—.14 to .19, average .16 plus .04. Secondary sensoria confined to fifth antennal segment, numbering from 0 to 1, usually 1. Long segment of beak extending to base of metathoracic coxae, and last segment extending to the beginning of the femora. Head with usual transverse line.

Thorax.—Dorsal margin of thorax with approximately six very small groups of wax pore-plates. Hind tibiae with approximately fifty sensoria on apical half of segment. Abdomen as in the stem mother except for the wax pore-plates which are very small and considerably lighter in color. Abdomen with posterior portion decidedly narrowed and elongated beyond cornicles. Abdomen in mature specimens usually containing but two or three eggs which are afterward deposited on the needles of the host.

ALATE MALE.

Average length of two specimens, 2.04. Head and thorax dark brown, shading to black. Abdomen with exception of genitalia light pea green. Antennae with exception of basal portion of third antennal segment dark brown. Beak colored as in stem mother; in length extending to beginning of femora of metathoracic legs. Proportional lengths of antennal segments as follows: III—.70 to .71; IV—.24 to .27; V—.30 to .34; VI—.19, plus .07. Secondary sensoria distributed as follows: III—85 to 96; IV—32 to 24; V—10 to 19; VI—0. Secondary sensoria distributed on all surfaces and throughout length of segments except on fifth segment where sensoria are more nearly confined to one side. The wings of both specimens are partly injured and consequently not good for study of venation. The hairs on the antennae are comparatively scarce, inclined at an angle of about 45°, and about one and two-fifths as long as the width of the segment. On the outer surface of the hind tibiae, the hairs are about three times as long as the width of this segment. Toward the base of the tibiae the hairs are quite upright, but toward the apex they are inclined at an angle of about 45°. The hairs on the male are much finer in quality than those of the females.

Data associated with specimens described here: July 15, 1931, immature stem mother observed; July 31, the mature stem mothers taken; August 5, viviparous female taken; August 24, oviparous female and males taken. All specimens were taken on *Picea pungens* Englm. growing in a comparatively small area on the top of Grand Mesa near Skyway, Colorado. The specimens were for the most part taken by vigorously beating the branches of trees, suspected of harboring this species, over a net. After their presence on a tree was detected by beating, a few specimens were obtained in the usual manner. These aphids occur singly at the base of the needles of the

present season's growth. They are not attended by ants. Their protective coloration is ideal, being nearly that of the color of the needles at their base. Once disturbed, the specimens move about very actively, somewhat suggestive of large spiders. It is surprising that no alate forms were observed during the collecting seasons of 1931 and '32.

On August 16, 1932, bright orange colored specimens, identical in all other respects to specimens herein described were collected.

Morphotype.—Apterous viviparous female (stem mother) July 21, 1931, Skyway, Colorado, on *Picia pugens*. *Allotype*.—Alate male, August 24, 1931, remaining data same as for stem mother. *Morphotype*.—Oviparous female, same data as male. All types herein described deposited in the U. S. National Museum.

***Cinara lasiocarpae* [Gillette & Palmer].**

OVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 4.93. Head dark brown, divided by darker median line. Thorax and abdomen brown, mottled with darker brown and powdery secretion. First antennal segment concolorous with head; remaining antennal segments yellowish with apical portions dusky. Last three segments of beak dark brown. Coxae and trochanters dark brown to black. Femora yellowish at base, shading to dark dusky brown apically. Tibiae yellowish-brown near the base, remaining portion varying from dusky brown to almost black at the apex. Tarsi dark blackish-brown. Base of cornicles dark dusky brown, considerably darker than the rest of the abdomen.

Head and appendages.—Antennal segments with the following comparative lengths: III—.93 to 1.07, average 1.02; IV—.39 to .43, average .416; V—.36 to .46, average .416; VI—.21, plus .07. Secondary sensoria distributed as follows: III—0; IV—0-1; V—2. Marginal sensoria on sixth segment, numbering about 6. Beak exceptionally long, reaching almost to base of cornicles.

Thorax.—Sensoria on hind tibiae too numerous to count, distributed throughout the length of tibiae except for the extreme basal portion.

Abdomen.—Cornicles situated on blunt basal cones which average .64 across base. Hair on antennae coarse, about twice as long as width of segment on the third antennal segment and about three times as long as width of segment on the fourth and fifth antennal segments, set at an angle of about 50°. Hairs on base of cornicles of one type similar to hair on rest of body. Hairs on outer margins of tibiae coarse and a little more than one-half width of segment.

Collection data for morphotypic female.—Collected on mature branches or trunks of young trees of *Abies lasiocarpi* Nutt., August 24, 1931, at Skyway, Colorado. Stem mothers and apterous viviparous females of this species were very abundant on the branches and trunks of young trees July 5, 1931. Two weeks later not an aphid of this species was to be found. Apterous viviparous females of this species were collected in the season of 1932 on the same trees infested during 1931. Alate viviparous

females of this species are yet to be taken. Morphotypic slide deposited in the U. S. National Museum.

Cinara wanepae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.43. Width of head across eyes, .64. Entire body shiny black. Third antennal segment somewhat lighter at the base than the remaining portion of the segment. Antennae otherwise dark brown. Femora yellowish-brown at the base, remaining portion brownish-black. Tibiae brownish-black. Prothoracic and mesothoracic tibiae somewhat lighter near the middle. Stigma dark brown, accessory radial thickening present. Beak brown, mottled with yellowish-brown.

Head and appendages.—Antennal segments with the following proportional lengths: III—.49; IV—.19; V—.26; VI—.14 plus .04. Secondary sensoria distributed as follows: III—six large circular sensoria arranged in a straight row; IV—1; V—2. Hairs on third antennal segment comparatively few for genus, forming an angle of more than 75° with the segment. Hairs on outer face of segment more upright than those on posterior face. Ocular tubercles poorly developed. Beak exceptionally long, reaching almost to the tip of the abdomen.

Thorax.—Veination very abnormal. Media apparently only once branched (exact condition impossible to determine due to faulty technique of mounting single specimen). Hind tibiae 2. long. Hairs on hind tibiae very upright and about one and one-half times as long as width of segment. Somewhat longer than this towards the apex and decidedly less upright.

Abdomen.—Base of cornicles .49 wide. Cauda much wider than long, differing very little from the anal plate.

APTEROUS OVIPAROUS FEMALE.

Size and general color.—Average length of body from vertex to tip of anal plate, 2.02. Average width of head through the eyes, .67. Entire body except appendages and portion of abdomen posterior to the cornicles shiny black. Portion of abdomen posterior to the cornicles white. The pulverulent matter appearing caked and shiny, decidedly different in appearance from the usual condition. First and second antennal segments concolorous with the head. Third antennal segment with basal two-thirds yellowish-brown, remaining portion brown; remaining antennal segments brown. Beak brown. Femora blackish-brown except at base where they are a yellowish-brown. Tibiae dusky brown but blackish at the knees, blackish-brown apically. Tarsi brownish-black.

Head and appendages.—Antennae with the following proportional lengths: III—.40 to .47, average .43; IV—.13 to .20, average .17; V—.20 to .23, average .22; VI—.10 to .14, average .12 plus .03 to .04, average .04. Secondary sensoria usually present on the third, fourth, and fifth antennal segments. On the third segment they vary from 0 to 2, on the fourth from 0 to 1, and on the fifth from 0 to 1. The beak is very long, reaching

at least to the base of the cornicles and usually almost to the tip of the abdomen.

Thorax.—Hind tibiae long (1.44), extremely free from sensoria. Hair on outer margins of tibiae about equal to width of segment or but very little shorter. Very upright except on curved portion of tibiae where they are somewhat more inclined.

Abdomen.—With the base of the cornicle about .45 wide. Cauda and anal plate as in the alate viviparous female.

If one be allowed to substitute oviparous females for apterous viviparous females where Gillette and Palmer's key in the Aphidae of Colorado, Part I calls for the latter, this species may be keyed to *Cinara vandykei*, from which it differs in the entire absence of pulverulent material in the alate viviparous female; in the size and length of the hind tibiae of the alate viviparous female; the broader and shallower cauda in the alate viviparous female; and the fewer sensoria on the hind tibiae of the oviparous female.

Holotype.—Alate viviparous female. *Morphotype*.—Apterous oviparous female collected on the stems and branches of *Picea pungens*, Skyway, Colorado, August 4, and August 23, 1932.

Aphis chipetae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.07. Width of head across eyes, .41. Head and thorax dark blackish-brown, darkest on the dorsum. Abdomen light green with brownish markings as follows: five lateral brownish spots anterior to the cornicles, each spot with a large green glandular area near the ventral surface; posterior to the cornicles there are three brownish bands extending from the lateral margins of the abdomen across the dorsum. The cornicles are not surrounded at their base by these brownish bands, they being concolorous at the base with the rest of the abdomen. Dorsum of abdomen with very faint, narrow, irregular rows of brownish specks which appear to originate in the brownish lateral spots. Cornicles very dark brown, almost black. Cauda with a V-shaped yellowish area extending almost its entire length on the dorsum, the remaining portion brown. Anal plate brown. Antennae uniform dark brown. Beak greenish-yellow basely, remaining portion brown. Femora with basal portion yellowish, remaining portion brown. Tibiae brown with apical portions usually somewhat darker. Tarsi brown. Veins of forewings very dark brown bordered with fuscous; edge of wings also bordered with fuscous.

Head and appendages.—Antennal segments with the following proportional lengths: III—.31 to .43, average .37; IV—.26 to .31, average .29; V—.24 to .29, average .25; VI—.09 to .11, average .10 plus .43 to .50, average .50. Secondary sensoria varying tremendously in size, situated on the third, fourth, and fifth antennal segments. All sensoria have very wide rims and are irregularly arranged. On the third and fourth antennal segments they appear to cover most of the surface. The secondary sensoria

are distributed as follows: On the third antennal segment varying from 18 to 40, average 28; on the fourth varying from 12 to 20, average 15; on the fifth varying from 7 to 9, average 8. All antennal segments finely imbricated and almost entirely hairless. Beak extending almost to the coxae of metathoracic legs.

Thorax and appendages.—Prothorax with lateral glandular areas similar to those found on the lateral surfaces of the abdomen. (These can only be seen on specimens mounted on the side.) Second fork of media not constant in position but usually closer to the first fork than to the margin of wing. Accessory radial thickening present.

Abdomen.—Lateral portion of abdomen with six segmentally arranged glandular areas. Brownish areas of abdomen reticulated. Cornicles equal to or subequal to length of fifth antennal segment, straight with a poorly developed rim at the apex, very finely and closely imbricated throughout their length. Cauda V-shaped, not much longer than its width at the base and not much longer, if as long, as the anal plate. Sides of cauda with numerous fine hairs.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 1.75. Average width of head through the eyes, .40. General color pale yellowish-green with the following exceptions: Head and prothorax sometimes very slightly dusky; tip of fourth and all of fifth and sixth antennal segments slightly dusky; apical portions of femora, tibiae, and all of tarsi light dusky brown; dorsum of abdomen occasionally with very light brownish mottlings; cornicles pale yellowish with apical portions sometimes dusky; cauda and anal plate pale brown; last two segments of beak brown.

Head and appendages.—Antennal segments with the following proportional lengths; III—.23 to .29, average .26; IV—.14 to .19, average .16; V—.13 to .16, average .15; VI—.07 to .09, average .09 plus .36 to .43, average .38. Secondary sensoria usually present only on third antennal segment, only very rarely on the fourth and fifth antennal segments. Sensoria similar to those of alate viviparous female, but less variable in size. On the third antennal segment the sensoria are usually confined to the basal half of the segment and number from 12 to 23, average 16. On the fourth antennal segment the sensoria may vary from 0 to 6, usually 0. On the fifth antennal segment the sensoria may vary from 0 to 5, usually 0. Beak long, usually reaching slightly beyond metathoracic coxae.

Thorax and abdomen.—Thorax and abdomen without lateral glandular areas. Dorsum of abdomen very finely reticulated. The reticulated areas showing best over the brownish mottled areas which are very irregular and not always present. Cornicles similar in shape and structure to those of alate viviparous female; in length subequal to the terminal filament of the sixth antennal segment. Cauda and anal plate similar to those of alate viviparous female.

Specimens of this species may be collected on the crowns of various

species belonging to the genus *Castilléia*, commonly known as Indian Paint-brush.

In the Plant Lice or Aphidae of Illinois specimens of this species key to *Aphis feminea* Hottes, from which they differ in color, in having the tubercles much less developed and in numerous other respects. In the Aphidae of Colorado, Part II, this species keys to *Aphis incognita* Hottes and Frison, from which it differs in type of cornicles, size of lateral tubercles, and color.

Holotype.—Alate Viviparous Female, Skyway, Colorado, July 12, 1932.
Morphotype.—Apterous Viviparous Female, same data as holotype. Holotypic and morphotypic slides deposited in the U. S. National Museum.

***Tuberculatus kiowanica*, new species.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Length from vertex to tip of anal plate, 1.57. Head and thorax yellowish tinged with light brown. Abdomen light yellowish-green. Cornicles, cauda, and anal plate yellow. Femora light yellowish with a tinge of green. Dorsally near the apex on the femora there is a slight dusky spot. Tibiae with brownish spots at the knees, remaining portions light dusky which become darker apically. Tarsi dusky brown. Stigma yellowish except at base, where it is slightly brownish. Veins of wings brown; anal vein darkest and most heavily bordered with fuscous. All veins ending in fuscous areas which blend into one another so that the veins may almost be said to have a fuscous border. Extreme tip of beak brownish. Antennae light yellowish-brown with apical portion of the segments darker. Surface around secondary sensoria darker than remaining portion of segment.

Head and appendages.—Comparative lengths of antennal segments as follows: III—.79; IV—.50; V—.46; VI—.21 plus .33. Secondary sensoria oval, limited to third antennal segment, numbering five, arranged in a straight row. Posterior to the antennae on the dorsum of the head there are two short, tubercle-like protuberances. Near the posterior margin of the head there is a pair of slightly better developed tubercles. The beak fails to reach the mesothoracic coxae by a considerable distance.

Thorax and appendages.—Prothorax with two pair of finger-like tubercles, the posterior pair considerably longer than the first, mesothorax with a pair of long, finger-like tubercles on the dorsum. Radial sector of wing comparatively short and much bowed. Second fork of media closer to first fork than to margin of wing. All veins fail to reach margin of the wing. An accessory radial thickness is present.

Abdomen.—Dorsum of abdomen with three pair of finger-like tubercles. Cornicles not trapezoidal, more aphis-like except for slight expansion at the apex, length .14. Cauda knobbed, provided with many long hairs, .14 long. Anal plate deeply divided.

Taken as a drift in net while sweeping *Pinus edules* for *Essigella* near Glade Park, Colorado, July 15, 1932.

The species may be immediately separated from *Tuberculatus punctatella* (Fitch) as it has the wings less fuscous, and by the presence of tubercles on

the head and thorax; in these respects it is quite similar to *Melanocallis caryaefoliae* (Davis) from which it differs in color, lateral tubercles, etc.

Holotype.—Alate viviparous female deposited in the U. S. National Museum.

***Amphorophora arnicae*, Glendenning.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Length from vertex to tip of anal plate, 2.98. Head and thorax dark brown on dorsum, blending to greenish-brown laterally. Abdomen green; lateral margins of abdomen with four brownish spots anterior to the cornicles, and one posterior to the cornicles. Entire body slightly pruinose. Cornicles dark brown to black. Anal plate brownish; cauda brownish at base, remaining portion yellow. Beak yellowish-green with last two apical segments brown; eyes black. First and second antennal segments concolorous with head; third antennal segment yellowish at base, remaining portion dark brown, much darker than the remaining segments, which are also brown. Coxae brown; trochanters yellowish-green. Femora yellowish-green at base, and from one-half to two-thirds of their length, remaining portion dark brown. Tibiae yellowish-brown with their apical portions dark brown; tarsi dark brown. Wings with stigma brownish; veins brown, ending in brownish suffusions.

Head and appendages.—Average width of head across eyes, .60. Antennal tubercles well developed. Antennal segments with the following comparative lengths: III—.86 to 1.07, average .98; IV—.57 to .61, average .58; V—.57 to .61, average .58; VI—.14 to .17, average .16 plus 1.11 to 1.21, average 1.16. Secondary sensoria limited to third antennal segment; irregularly arranged, usually over entire surface, numbering from 41 to 57. Hair on third antennal segment about one-third shorter than width of segment. The beak reaches to the middle of mesothoracic coxae.

Thorax and appendages.—Prothorax without lateral tubercles. Stigma of fore wings comparatively long and narrow, rather sharply pointed at apex. Second fork of media closer to first fork than to margin of wing. Veins fine, ending in brownish suffusions before reaching margin of wing. Femora of all legs with a row of sensoria on their lateral surfaces.

Abdomen.—Without lateral tubercles. The cornicles are either equal to or slightly shorter than the third antennal segment; uniformly swollen distal to middle but constricted again before apex. Apical portion of cornicle with about six rows of closed reticulations, remaining portion roughly imbricated. Anal plate broadly rounded. Cauda very broad at the base, somewhat constricted at the middle, with about three hairs on a side. In length from .36 to .43, average .38.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 3.22. Head and thorax light dusky green. Abdomen green with a grayish cast due to scant pruinescence; cornicles dusky brown; cauda yellowish; anal plate dusky brown. First and second antennal segments somewhat

darker than the head; third antennal segment light at the base, remaining portion brown; fourth, fifth, and sixth antennal segments dusky brown with distal portions darkest. Beak with last two segments brown. Coxae and trochanters yellowish-green. Femora with the basal halves yellowish-green, remaining portions dusky brown. Tibiae dusky brown with apical and distal portions darker. Tarsi brown.

Head and appendages.—Average width of head through the eyes, 60. Antennae situated on well developed antennal tubercles. Antennal segments with comparative lengths as follows: III—.89 to .94, average .92; IV—.57 to .59, average .58; V—.59 to .60, average .60; VI—.14 plus .93 to 1.11, average 1.07. Secondary sensoria confined entirely to the third antennal segment; for the most part limited to the basal two-thirds of segment and while irregularly arranged, are confined largely to one side. The primary sensorium on the sixth antennal segment is fringed with a row of stiff spine-like hairs. All antennal segments are more or less imbricated; this is especially true of the fourth, fifth, and sixth segments. The hair on the antennae are spine-like in quality and never longer than the width of the segment. The beak is long, reaching to the base of the metathoracic coxae.

Thorax and appendages.—All femora have sensoria-like structures. The tarsi are very short, being subequal in length to the basal portion of the sixth antennal segment. The hairs on the tibiae are fairly numerous, heavy and spine-like and about equal to the width of the segment in length.

Abdomen.—Average length of cornicles, .87. Cornicles uniformly swollen distal to middle for about one-third of their length and then again reduced in diameter toward their apex; flange poorly developed; apex distinctly reticulated, remaining portion of cornicle imbricated. Anal plate well developed about one and one-half times as wide at the base as long. Cauda constricted, well rounded at the apex, usually with from two to four hairs on a side, length from .31 to .36, average .33.

ALATE MALE.

Size and general color.—Length from vertex to tip of anal plate, 1.86. Color essentially similar to that of alate viviparous female.

Head and thorax.—Antennal tubercles less developed than in the females. Antennal segments with the following proportional lengths: III—.96; IV—.64; V—.57; VI—.14 plus 1.36. Secondary sensoria on third antennal segment numbering from 48 to 52. There are no secondary sensoria on the fourth antennal segment. Secondary sensoria on fifth antennal segment numbering from 19 to 23. Sensoria on third and fifth antennal segments irregularly arranged. Hairs on third antennal segments shorter than width of segment. Beak reaching just beyond metathoracic coxae. Thorax without lateral tubercles. Wings as in alate viviparous female.

Abdomen.—Cornicles .50 long; in shape and reticulations similar to those of female, perhaps slightly less imbricated. Lateral tubercles absent. Cauda long (.17), aphid-like with four hairs on a side, not constricted.

This species is very closely allied to *Amphorophora davidsoni* Mason, to which alate viviparous females key in Mason's revision of the genus *Amphorophora*. I am provisionally retaining *Amphorophora arnicae* as a good species until further collecting substantiates my opinion that the species migrates between thimbleberry and Arnica. In the two years that I have collected *Amphorophora arnicae*, I have never taken it before July 4th, and at that time only alate viviparous females were taken. This might be taken as evidence that the species migrates between thimbleberry and Arnica, were it not for the fact that I have taken but three apterous viviparous females in the two years collecting. The oviparous females are evidently not produced in Arnica, while the males are. This further indicates that a host other than Arnica is the primary one. The differences shown by the males of the two species are but minor differences, with the possible exception of the presence of abdominal tubercles, in the case of the male of *Amphorophora davidsoni* and not in *Amphorophora arnicae*. The fact that the males agree so nearly in peculiar characteristics such as the absence of sensoria on the fourth antennal segment and the short cauda would seem to further suggest that the species are extremely closely allied if not synonymous. Through the courtesies of Professor Glendenning and Dr. Mason, I have been privileged to study cotypic material of the two species concerned.

Morphotype.—Apterous viviparous female taken on Arnica species; Skyway, Colorado, August 15, 1931. *Allotype*.—Alate male, Skyway, Colorado, August 16, 1932. Allotypic and morphotypic slides deposited in the U. S. National Museum.

Amphorophora tigwatensa, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.78. Average width of head across eyes, .61. Head yellowish-brown with antennal tubercles, the first and second antennal segments, and anterior and lateral margins darker brown. Thorax yellowish-green with thoracic lobes brown. Abdomen quite variable in color, usually light green, occasionally somewhat pinkish on the dorsum, with brownish lateral spots. The pink and the brown blending into green where either are not pronounced. Antennae brown with the exception of the base of the third antennal segment, which is yellowish. The fourth, fifth and sixth antennal segments may be almost black. Beak brown. Stigma brownish, darkest ventrally. Veins of wings dark brown bordered with fuscous. Accessory radial thickening present. Coxae and trochanters yellowish. Femora yellowish at extreme base, gradually increasing in color to apex, where they are a very dark brown. Tibiae almost uniform dark brown. Tarsi brown. Cornicles dark brown. Cauda yellowish, somewhat tinged with fuscous. Anal plate fuscous.

Head and appendages.—Proportional lengths of antennal segments as follows: III—1.04 to 1.26, average 1.17; IV—.93 to 1.00, average .97; V—.86 to .94, average .89; VI—.21 plus 1.14 to 1.22, average 1.19. Second-

ary sensoria confined to third antennal segment, numbering from 25 to 32, averaging 29. Secondary sensoria irregularly arranged but confined to one side of segment, sometimes arranged in an irregular row. The secondary sensoria vary in size and have wide rims. Hairs on third antennal segment (about one-third width of segment), spine-like, not knobbed, but dull at tip. Primary sensorium on sixth antennal segment fringed, with six marginal sensoria at one side. All segments imbricated. Beak extending to mesothoracic coxae.

Thorax.—Stigma of forewings sharply pointed. All veins fail to reach the margin of the wing. Second fork of media closer to the margin of the wing than to the first fork.

Abdomen.—Cornicles varying in length from .89 to 1.00, average .94, not reticulated, imbricated throughout their length. Rimmed as in *Amphorophora rubi* (Kalt.). Cauda varying in length from .34 to .43, average .39, not constricted with from four to five hairs on a side, the hairs being shorter than the width of cauda.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.85. Color essentially similar to that of alate viviparous female except that the legs and antennae are a less intense brown, and that the body is less apt to be of a greenish tint, pinkish brown colored individuals being most abundant.

Head and appendages.—Average width of head through the eyes, .59. Proportional lengths of antennal segments as follows: III—1.07 to 1.17, average 1.14; IV—.81 to 1.07, average .92; V—.71 to 1.00, average .825; VI—.16 to .21, average .19 plus .96 to 1.14, average 1.04. Secondary sensoria confined to third antennal segment numbering from 10 to 15, averaging 12. Secondary sensoria irregularly arranged but confined to one side of segment. Hair on third antennal segment about one-half width of segment. Cornicles varying in length from 1.00 to 1.14, average 1.05. In shape and imbrications similar to those of alate viviparous female. Cauda varying in length from .39 to .40, average .39 plus, usually with four to 5 hairs on a side, shorter than width of cauda and inwardly curved.

Holotype.—Alate Viviparous Female. *Morphotype*.—Apterous Viviparous Female. Collection data to accompany holotypic and morphotypic specimens as follows: Skyway, Colorado, July 26, 1932, on *Rubis species*, on which they were collected on the undersides of the leaves and on the young tender stems. Morphotype and holotype mounted on same slide, deposited in the U. S. National Museum.

Apterous viviparous females of this species key with difficulty to *Amphorophora amurensis* Mordvilko (known only from the apterous viviparous female) in Mason's revision of the genus *Amphorophora*. While admitting that *Amphorophora tigwatensa* may be a synonym of the species described by Mordvilko, my specimens differ from the description of *Amphorophora amurensis*, as translated by Mason, by having the antennae longer than the body, antennal segments three and four not of the same relative lengths,

by the third antennal segments not having capitate hairs, and by the hairs being shorter than three-fifths the width of segment, by the cornicles being imbricated, and by the cornicles being proportionally longer to the length of the body.

Adactynus katonkae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.74. Head light green, showing some duskiness. Thorax green with thoracic lobes somewhat dusky. Abdomen green. Cornicles dusky brown except at the base where they are white or slightly yellowish. Cauda dusky yellow. Anal plate yellowish-brown, considerably darker than the cauda. First and second antennal segments somewhat more dusky green than the head. Antennae except base of third antennal segment and sometimes the base of fourth antennal segment dusky brown to black. Beak greenish with the apical two segments dark brown. Femora light greenish-yellow for a little less than one-half their length, remaining portions shading gradually to dark brown at the apex. Tibiae dark brown, somewhat lighter basely than apically. Tarsi dark brown. Stigma light dusky. Veins brown.

Head and appendages.—Average width of head across eyes, .53. Antennal segments with the following proportional lengths: III—.93 to 1.07, average .97; IV—.71 to .86, average .76; V—.61 to .71, average .67; VI—.17 to .21, average .19 plus 1.00 to 1.14, average 1.09. Secondary sensoria irregularly arranged, confined to third antennal segment, distributed through the entire length of segment and varying in number from 22 to 35, average 33. Hair on third antennal segment rather spine-like and shorter than or just equal to width of segment. The beak reaches about to the middle of the mesothoracic coxae.

Thorax and appendages.—Stigma rather long and sharply pointed. Second fork of media as a rule closer to margin of wing than to the first fork. Veins ending in fuscous areas before attaining margin of wing.

Abdomen.—Cornicles varying in length from 1.21 to 1.50, average 1.36; reticulated at their apex for about one-third their length (.46), remaining portion finely imbricated. Rim at apex of cornicles rather poorly developed. Cauda varying in length from .53 to .64, average .56; not constricted, tapering to a sharp point at the apex, finely imbricated with from three to four hairs on a side. Anal plate normal for genus.

APTEROUS VIVIPAROUS FEMALE.

Average length from vertex to tip of anal plate, 2.85. In color identical with alate viviparous female except that the head is less dusky. Antennae with the following proportional lengths: III—.86 to 1.17, average 1.02; IV—.64 to .79, average .71; V—.60 to .79, average .68; VI—.17 to .21, average .18 plus 1.00 to 1.07, average 1.03. Secondary sensoria confined to one side of third antennal segment and irregularly arranged, varying in

number from 15 to 24, averaging 20, usually not extending beyond basal three-fourths of segment. Cornicles similar to those of alate viviparous female, varying in length from 1.43 to 1.57, average 1.51, reticulated apically for a little less than one-third of their length (.45). Cauda similar to that of alate viviparous female, varying in length from .57 to .79, average .67.

This species keys in most keys to *Adactynus erigeronensis* (Thomas) = *Adactynus erigeron*—*philadelphicum* Raf., from which it may be separated by its larger size, longer cornicles, cauda and antennal segments.

Holotype.—Alate viviparous female, Whitewater, Colorado, August 10, 1932. *Morphotype*.—Apterous viviparous female, same data as holotype. Holotypic and morphotypic slides deposited in the U. S. National Museum. This species was collected on the stems and the undersides of the leaves of *Aster laevis* L. Specimens of this species were observed near Red Cliff, Colorado, August 31, 1932, on the same host.

***Adactynus kiowanepus*, new species.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.57. Head, thorax, and abdomen bluish with a reddish tinge, entirely pruinose; color not unlike that found on certain varieties of plums when ripe and unrubbed. Anterior margins of head dusky. Margins of thoracic lobes dusky and the four segments anterior to the cornicles with lateral portions usually dusky. Antennae black or very dark brown except for base of third and all of first and second antennal segments, which are only brown or dusky brown. Beak brown with terminal segment darkest. Coxae and trochanters yellowish. Femora yellowish at extreme base, shading gradually to brown, the brown quickly becoming black or blackish-brown. The area thus colored being equal to about one-third of the length of the segment. Tibiae and tarsi black or blackish-brown. Hairs on antennae and legs with their basal papillae yellowish. Stigma yellowish-brown, accessory radial thickening present. Outer margins of wing slightly fuscous. Veins brownish with just a suggestion of a fuscous border. This border is more pronounced along the radial sector than the media. Cornicles black or very dark brown except for extreme basal portion which may be yellowish or yellowish-brown. Cauda light yellowish brown. Anal plate brownish.

Head and appendages.—Average width of head through the eyes, .60. Antennal tubercles well developed. Antennal segments with the following proportional lengths: III—1.03 to 1.14, average 1.09; IV—.93 to 1.00, average .965; V—.77 to .83, average .81; VI—.17 to .20, average .19 plus 1.26 to 1.29, average 1.28. Secondary sensoria confined to third antennal segment, arranged in a straight row, quite small and due to dark color of the segment very difficult to distinguish, numbering from 8 to 19, averaging 13. Hair on basal half of third antennal segment subequal to width of segment. Hair on apical half of third antennal segment either equal to or longer than width of segment. The beak is short, failing to reach the

mesothoracic coxae by a distance equal to the width of the coxae at their base.

Thorax.—Prothorax without lateral tubercles. Radial sector very much bowed. Second fork of media closer to margin of wing than to first fork. Second segment of hind tarsus, exclusive of claws, equal to basal portion of sixth antennal segment. Cornicles varying in length from 1.14 to 1.31, average 1.21. Reticulated area at apex of cornicles varying from .14 to .17, average .16, and never equal to more than one-seventh of the length of the cornicles, usually nearer one-eighth their length. Portion of cornicles not reticulated distinctly imbricated. Cornicles neither constricted nor swollen, but tapering gradually from a rather wide base to the apex. Cauda varying in length from .50 to .57, average .55, usually with four hairs on one side and five on the other, each hair arising from an angular area which causes the sides of the cauda to appear very coarsely serrate. Cauda constricted just before middle.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.73. Average width of head through the eyes, .60. Color essentially similar to that of alate viviparous female; structurally similar in all respects to alate viviparous female. Antennal segments with the following proportional lengths: III—1.03 to 1.14, average 1.11; IV—.74 to .86, average .77; V—.64 to .76, average .70; VI—.14 to .19, average .16 plus .96 to 1.09, average 1.04. Secondary sensoria confined to basal third of segment, arranged in a straight row, numbering from 3 to 8, generally 5 or more. Cornicles varying in length from 1.17 to 1.36, average 1.31. Reticulated portion of cornicle averaging .16 in length or a little more than one-eighth of the total length of the cornicles. Cauda varying from .57 to .64, average .61. Otherwise similar to that of alate viviparous female.

This species is closely allied to *Adactynus pseudorosae* (Patch) (although it will not key to this species) from which it may be separated by its color in life and by the relative proportional lengths of the third antennal segment and cornicles to each other, and the two of these to the length of the anal vein. It also differs from *Adactynus pseudorosae* by having the cornicles reticulated for one-seventh or less than one-seventh of their length rather than one-sixth or more than one-sixth of their length. In Dr. Patch's key to the genus *Macrosiphum* (Main Agricultural Bulletin #282) specimens of this species key to *Macrosiphum californicum*. In the key to the genus *Macrosiphum* in the Plant Lice or Aphidae of Illinois, the species keys to *Macrosiphum laevigatae* Essig. (The specimens studied by Patch and Hottes and Frison unquestionably being the same species in spite of the use of different names.) From *Adactynus laevigatae* it may be distinguished at once by its color.

Specimens of this species may be collected on the under surfaces of the leaves and the flower stems of *Zygadenus* sp. and *Sieversia ciliata*.

Holotype.—Alate viviparous female, Skyway, Colorado, July 26, 1932, on *Quamasia hyacinthia*. *Morphotype*.—Apterous viviparous female, same

data as holotype. Holotypic and morphotypic slides deposited in the U. S. National Museum.

***Adactynus niwanista*, new species.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.19. Head dusky brown, often showing more or less yellow. Thorax yellowish-green with thoracic lobes dark brown. Abdomen light green with four lateral light brown areas anterior to the cornicles and one such area posterior to the cornicles. Dorsum of abdomen with two transverse greenish-brown bands. These bands vary in size, intensity, regularity, and are never distinct. Cornicles light greenish-yellow, becoming slightly dusky towards the apex. Cauda light dusky green. Anal plate light dusky. Third antennal segment uniform light yellowish-brown; fourth antennal segment brown, slightly dusky at the apex; fifth and sixth antennal segments light brown or dusky. Beak yellowish with the exception of two apical segments, which are brown. Stigma light brown. Veins brown, more or less bordered. Coxae and femora light yellowish-green, very faintly dusky toward apex. All tibiae greenish-yellow except for apical ends, which are brown. Tarsae brown. Entire surface of body pruinose, which gives the insect the appearance of having over-primed.

Head and appendages.—Average width of head across eyes, .76. Antennal tubercles well developed. Antennal segments with the following proportional lengths: III—.79 to .83, average .80; IV—.83 to 1.00, average .90; V—.79 to .83, average .81; VI—.24 to .31, average .28 plus 1.64. Secondary sensoria confined to third antennal segment and except for one or two sensoria are arranged in a straight row, numbering from 12 to 18, usually over 15. Sensoria comparatively small. Hair on third antennal segment fine, shorter than width of segment. Third antennal segment very smooth, the fourth and fifth antennal segments very lightly imbricated, the sixth distinctly so. Primary sensorium on sixth antennal segment apparently without a fringe, with six marginal sensoria on one side of primary sensorium. The beak reaches mid-way between the meta and mesothoracic coxae.

Thorax and appendages.—Prothorax with lateral tubercles. Stigma somewhat pointed, sub-radial thickening present. Second fork of media closer to margin of wing than to first fork; all veins failing to reach the margin of the wing. Second segment of tarsae long, about equal to basal portion of sixth antennal segment.

Abdomen.—Cornicles varying in length from .43 to .57, average .48. Sides of cornicles straight; cornicles of uniform thickness, rather broad and heavy; light colored portion faintly imbricated; dusky portion reticulated, but the reticulated areas are narrow and much elongated, so that at first glance the cornicles appear to be merely distinctly imbricated. Cauda varying in length from .34 to .43, average .38. Cauda non-constricted or but ever so slightly, rather spatula-like with from four to six hairs on a side. Anal plate broad.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.97. Average width of head through the eyes, .70. Entire body fairly uniform pale green, occasionally almost white due to pulverulent matter (pulverulent matter always present). The black eyes of exceptionally pulverulent specimens are exceptionally conspicuous. Antennae pale greenish-yellow except for extreme tip of fifth and all of sixth segments, which are brownish. Legs pale yellowish-green except for apical portions of tibiae and tarsae which are brown.

Head and appendages.—Proportional lengths of antennal segments are as follows: III—.71 to .83, average .77; IV—.87 to .93, average .89; V—.74 to .86, average .78; VI—.26 to .31, average .29 plus 1.50 to 1.57, average 1.52. Antennal tubercles especially well developed. Secondary sensoria confined to third antennal segment, varying in number from 1 to 2, usually only 1; removed from base of segment by distance about equal to length of first antennal segment. Imbrications very faint on third and fourth segments, more pronounced on the fifth and sixth. Hair on antennae sparse, fine, usually shorter than width of segment. Beak usually just reaching anterior margins of metathoracic coxae, sometimes not extending beyond mesothoracic coxae.

Abdomen.—Cornicles varying from .50 to .57, average .52. Otherwise as in alate viviparous female. Cauda varying from .36 to .43, average .41, not constricted, with from four to five hairs on a side.

This species in some morphological respects is suggestive of *Adactynus granarium* (K), (to which it may be keyed in the Plant Lice or Aphidae of Illinois), from which it differs in size and in characteristics shown by cauda, cornicles, and the presence of pulverulent matter.

Holotype.—Alate viviparous female, Skyway, Colorado, August 22, 1932.

Morphotype.—Apterous viviparous female, Skyway, Colorado, August 4, 1932. Specimens of this species were collected on the under-surfaces of the leaves of *Mertensia siberica*. Holotypic and morphotypic slides deposited in the U. S. National Museum.

Adactynus tutigula, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.50. Head and antennae with exception of extreme base of third antennal segment dusky brown. Prothorax with lateral margins greenish, shading to dusky brown on the dorsum. Thoracic lobes brown, conspicuously outlined with yellowish-green which extends laterally to the sides of the thorax. Coxae and trochanters yellowish-green. Femora yellowish-green at base, remaining portions dusky brown to brown. Prothoracic femora with least amount of brown; metathoracic femora with greatest amount of brown. Tibiae brown, knees and apical portions usually darkest. Abdomen green with four lateral brownish spots anterior to the cornicles and from four to five brownish areas arranged in transverse rows on the dorsum. The brownish areas on the dorsum are very indistinct, subject to great

irregularity and are best seen near the lateral portions of the abdomen where they appear integrated with the lateral brownish areas. Cornicles uniform light dusky. Cauda yellowish-green. Anal plate dusky or concolorous with rest of abdomen. Entire surface of body pulverulent.

Head and appendages.—Average width of head through the eyes, .56. Antennal tubercles moderately well developed. Antennal segments with the following proportional lengths: III—.81 to .87, average .84; IV—.54 to .70, average .64; V—.50 to .57, average .54; VI—.16 to .21, average .18 plus .64 to .71, average .70. Secondary sensoria unequal in size with wide rims, irregularly arranged, covering most of surface, confined to the third antennal segment, numbering from 47 to 60, averaging 54. Hair on third antennal segment sparse and fine, shorter than one-third width of segment. All antennal segments finely imbricated. The beak fails to reach the mesothoracic coxae by a considerable distance.

Thorax.—Prothorax with poorly developed lateral tubercles. Stigma rather long and sharply pointed. Second fork of media closer to margin of wing than to first fork. All veins fail to reach the margin of the wing.

Abdomen.—Brownish lateral areas on the abdomen, each with a very small tubercle. Brownish areas on dorsum of abdomen for the most part reticulated. Cornicles straight, rather heavy, with a slightly developed flange at apex, imbricated throughout their length but with the imbrications most distinct apically, varying in length from .31 to .36, average .34. Cauda varying in length from .21 to .29, average .23, with just a suggestion of a constriction near the middle, with about three hairs to a side.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.66. Average width of head across eyes, .58. Entire body pale yellowish-green except for the apical portion of the fifth antennal segment, all of the sixth antennal segment, the apical portions of tibiae, and the tarsi, which are brown. Antennal segments with the following proportional lengths: III—.77 to .86, average .80; IV—.51 to .64, average .55; V—.46 to .50, average .47; VI—.17 to .20, average .18 plus .61 to .74, average .65. Third antennal segment with from 2 to 10 small circular sensoria near the base, usual number of sensoria 6. All antennal segments finely imbricated. Beak reaching just to base of mesothoracic coxae.

Thorax.—Prothorax with lateral tubercles but they are so small that they are easily overlooked.

Abdomen.—Abdominal segments with minute lateral tubercles. Cornicle varying in length from .33 to .36, average .35. Otherwise as in alate viviparous female. Cauda as in alate viviparous female, varying in length from .23 to .26, average .24.

This species is suggestive of *Adactynus nigwanista* new species, from which it differs in the number and arrangement of secondary sensoria and the imbrications of the cornicles being more conspicuous.

Holotype.—Alate viviparous female, Skyway, Colorado, July 26, 1932, on *Capnoides* sp. *Morphotype.*—Apterous viviparous female, same

data as holotype. Morphotypic and holotypic slides deposited in the U. S. National Museum. This species is exceptionally abundant on the under-sides of the leaves and upon the flower stems of its host.

Adactynus wasintae, new species.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 1.37. General color of body except appendages pale dull green. Antennae varying from pale greenish, concolorous with the head, to pale dusky brown. Femora pale yellowish-green throughout or yellowish-green at the base with the apical portions light dusky. Tibiae light brown with apical portions considerably darker. Tarsi brown. Cornicles and cauda light dusky green. Beak yellowish-green except for the apical segment, which is darker.

Head and appendages.—Average width of head across eyes, .46. Antennal segments with the following comparative lengths: III—.71 to .91, average .80; IV—.66 to .76, average .67; V—.54 to .64, average .60; VI—.16 to .21, average .19 plus .79 to .93, average .83. Secondary sensoria confined to basal one-third of third antennal segment, arranged in a straight row, numbering from 1 to 4, usually 2. The beak reaches about to the middle of the metathoracic coxae. The apical segment of the beak is as long as the tarsi exclusive of claws.

Abdomen.—Cornicles subequal to the fourth antennal segment in length. Sides of cornicles straight but tapering somewhat to the apex, which has a weakly developed flange, entire surface weakly imbricated. Cauda about two times length base of sixth antennal segment, not constricted, with three pairs of hairs on a side.

This species may be collected preferably by beating *Dasyphora fruticosa* (as they never occur abundant enough to make collecting in the usual manner worth while). Once observed by beating, single specimens may be taken on the undersides of the leaves of the host plant. So far only apterous viviparous females have been observed in spite of the fact that alate viviparous females were searched for biweekly throughout two seasons collecting. Specimens of this species are somewhat suggestive of minute specimens of *Adactynus pisi* (Kalt.).

Holotype.—Apterous viviparous female; Skyway, Colorado, August 4, 1932, on *Dasyphora fruticosa*, deposited in U. S. National Museum.

Dactynotus wahinkae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 1.84. Body bright, shiny, greenish-bronze with a metallic luster. Head and first two antennal segments dark dusky brown. Thorax for the most part dark dusky brown, remaining portion green. Abdomen dark green with five lateral brownish areas anterior to the cornicles and two brownish areas posterior to them. In addition to the lateral brownish areas on the

abdomen there may be transverse rows of more or less indistinct brownish areas or spots on the dorsum of the abdomen, each row consisting of about six, more or less irregular, brownish areas which vary considerably in size. Cornicles light yellowish dusky. Cauda and anal plate light dusky brown. Antennae varying from brown to black with the third segment darkest. Basal portions of segments, especially of the third segment, lighter than the remaining portion. Last two apical segments of beak dark brown, remaining portion greenish mottled with brown. Coxae dark brown. Femora with basal halves greenish, remaining portion gradually shading to dark brown. Tibiae brown, gradually growing darker from the middle towards the apical end. Tarsi dark brown. Stigma dark brown. Accessory radial thickening present. Veins very dark brown, bordered with fuscous.

Head and appendages.—Average width of head, .50. Antennal tubercles present not gibbous, for genus poorly developed. Hair on vertex of head slightly enlarged at the tip. Antennal segments with the following relative lengths: III—.71 to .79, average, .74; IV—.36 to .50, average .45; V—.31 to .39, average .36; VI—.09 to .14, average .13 plus .71 to .93, average .84. Secondary sensoria confined to third antennal segment ranging in number from 49 to 64, average 58. Hair on third antennal segment confined to one side of segment and shorter than the width of segment and sharply pointed. The secondary sensoria are very tuberculate and irregularly arranged over the entire surface of the segment. Primary sensoria on basal portion of sixth segment with a group of six marginal sensoria at one side. Beak short, as a rule not reaching mesothoracic coxae.

Thorax and appendages.—Stigma of fore wings somewhat pointed at the apex. Second fork of media usually midway between first fork and margin of wing; when not so, closer to margin. All veins fail to reach the margin of the wing and end in fuscous infusions which have a tendency to form a border. Darkened areas of femora with sensoria. Wings usually gummed up so that flight is impossible.

Abdomen.—Cornicles varying from .19 to .21, average .19, faintly imbricated and slightly constricted just before the poorly developed flange. Cauda varying from .14 to .17, average .16, extending beyond anal plate for less than half its length, finely imbricated, rather thick and blunt with about four hairs on a side. Anal plate normal. Abdomen clothed with long hairs which are slightly enlarged at the tip.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.93. Average width of head, .51. Color varying from green with dusky markings to fairly dark brownish-green with a metallic luster, in which case the brownish areas mentioned as being present on the abdomen in the alate viviparous female do not show. Head and first two antennal segments greenish-brown shaded with dusky. Anterior portion of abdomen slightly more dusky and less greenish than the posterior portion of the abdomen. In light colored specimens there may be distinguished, beginning with the thorax, about ten rows of brownish spots arranged transversely across the

dorsum of the body. These spots show only along the margin of the abdomen in the darker forms. The spots on the thorax are more or less confluent on the dorsum. On the dorsum of the abdomen, each spot gives rise to a hair which is slightly enlarged at the tip. The lateral spots on the abdomen may bear two or more hairs each. Antennae brownish with the apical portion of the segments darker. Beak, cauda, cornicles, and legs as in the alate viviparous female or but slightly darker.

Head and appendages.—Antennal tubercles as in alate viviparous female. Antennal segments with the following relative lengths: III—.60 to .71, average .67; IV—.30 to .43, average .36; V—.29 to .31, average .30; VI—.10 plus .57 to .71, average .64. Secondary sensoria confined as a rule to the basal half of the third antennal segment, irregularly arranged but partial to one side, varying in number from 11 to 38, average 24, usually more than 20. Sensoria less tuberculate than those of alate viviparous female. Hair on third antennal segment almost as long as width of segment, inclined to be rather sharply pointed. Beak reaching midway between meso and metathoracic coxae.

Abdomen.—Cornicles varying from .19 to .21 in length. Similar in shape and structure to those of alate viviparous female. Cauda .16 long, similar to that of alate viviparous female in form.

This species may be collected on the flower heads and later on the seed pods as well as on the under-side of the leaves of *Delphinium occidentale*. It is very difficult to place generically. It differs from *Aphis rociadae* Cockerell, the only other species recorded from the host, generically, in color, and biologically. I know of no near relative within the genus that I have placed it in.

Late in the fall there is a tendency for this species to produce bright reddish-orange colored specimens which are morphologically identical, in all respects, with the species here described.

Holotype.—Alate viviparous female, Skyway, Colorado, August 15, 1932, on *Delphinium occidentale*. *Morphotype.*—Apterous viviparous female same data as Holotype. Holotypic and morphotypic slides deposited in the U. S. National Museum. Specimens of the above species have also been taken on *Aconitum columbianum* in the type locality.

Dactynotus (Kakimia) takalus, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.14. Head and thorax dusky brown. Abdomen yellowish-green. Cornicles with basal areas concolorous with abdomen, remaining portions slightly dusky. Cauda and anal plate yellowish-brown. Antennae concolorous with the head or but slightly darker except for base of third antennal segment, which is yellowish (third segment usually darkest). Legs with basal half of femora yellowish-green, remaining portions of femora brown. Tibiae either uniform brown or light brownish with apical portions darker. Tarsi brown. Hairs on tibiae with basal papillae yellow-

ish. Stigma of wings with inner margins brownish. Veins dark brown and bordered. Accessory radial thickening present.

Head and appendages.—Width of head through eyes, .48. Antennal tubercles not well developed, similar in this respect to species in the subgenus *Kakimia*. Antennal segments with the following comparative lengths: III—.71 to .80, average .76; IV—.30 to .36, average .34; V—.23 to .26, average .25; VI—.07 to .1, average .09 plus .53 to .57, average .56. Secondary sensoria arranged very irregularly and very tuberculate on the third and fourth antennal segments. On the third antennal segment ranging from 63 to 70, average 66; on the fourth antennal segment numbering from 16 to 23, average 20. Primary sensorium on the sixth antennal segment small with a group of six marginal sensoria grouped at one side. Hair on third and fourth antennal segments shorter than width of segment and somewhat blunt at the tip or ever so slightly enlarged apically. The beak reaches to or slightly beyond the middle of the metathoracic coxae.

Thorax and appendages.—The prothorax is without lateral tubercles. Second branch of media varying all the way from being closer to the margin of the wing than to the first branch to being midway between the first branch of the media and the margin of the wing. None of the veins reach the margin of the wing. Tarsi very short, shorter than basal portion of the sixth antennal segment.

Abdomen.—Cornicles straight (varying in length from .31 to .41, average .36), with a very poorly developed flange at the apex; dusky portion usually more or less imbricated. Cauda somewhat narrow for length, subequal to the fifth antennal segment in length; somewhat constricted near the middle with two or three inwardly curved hairs on a side. Anal plate normal for the genus.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.38. Entire body light greenish-yellow. Antennal segments light yellowish-brown basely with the apical portions darker. Terminal segment of beak brown. Legs yellowish-green except for apical portions of tibiae and tarsi which are brown. Cornicles lighter in color than the abdomen with just a suggestion of duskiness at their apex. Cauda and anal plate slightly brownish.

Head and appendages.—Width of head through eyes, .50. Antennal segments with the following comparative lengths: III—.50 to .66, average .60; IV—.29 to .33, average .31; V—.17 to .27, average .23; VI—.09 to .1, average .095 plus .43 to .50, average .48. Secondary sensoria irregularly arranged on the third antennal segment, where they number from 13 to 41, average 25. Sensoria less tuberculate than those of alate viviparous female, usually confined to one side of the segment. When present on the fourth antennal segment, the sensoria vary from 1 to 7. The beak reaches beyond the coxae of the mesothoracic legs. Legs similar in structure to those of alate viviparous female.

Abdomen.—Cornicles subequal in length to terminal processes of sixth

antennal segment; similar in other respects to those of alate viviparous female. Cauda about equal to fifth antennal segment in length, otherwise similar to that of alate female. Specimens of this species may be collected on the undersides of the leaves and on the flower stems of *Gilia aggregata*.

This species keys in the Plant Lice or Aphidae of Illinois to *Myzus lactucae*, from which it differs in the type of cornicles, the type of antennal tubercles, and color markings on abdomen.

Holotype.—Alate viviparous female, Whitewater, Colorado. *Morphotype*.—Apterous viviparous female, Whitewater, Colorado, July 8, 1931. Holotypic and morphotypic slides deposited in the U. S. National Museum.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

SOME NEW TREEHOPPERS FROM THE SOUTHWEST
WITH NOTES ON OTHERS.

BY E. D. BALL,
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Treehoppers are as a rule strictly confined to a single host or to closely related species of plants. It is little wonder then that intensive collecting in the arid Southwest should bring to light a number of new species and that a number of these should represent genera not previously known from the United States, while others represent new and striking adaptations in food plants as compared with their eastern relatives.

***Palonica nogalana* Ball, n. sp.**

Similar to *viridia* but smaller, narrower with a higher and more foliaceous crest, green with a dusky line on the back of the crest. Length ♀ 10 mm., ♂ 8 mm., width 5.5 mm.

Pronotum long low acute; crest nearly equilaterally triangular, much higher and more angular than in *viridia*; as long as in *tremulata*, but more definitely angled above, the apex rounding with a slight but definite step on the posterior face. Humeral angles one-half longer with the anterior margin less rounding than in *viridia*. The crest as seen from in front is higher and much narrower with a definite separation between its slope and that of the metapodium.

Color light green, not polished as in *viridia*. The carina on the apex of crest, and a line bordering the posterior face dusky. The apex of pronotum and elytra smoky.

Holotype¹ ♀, allotype ♂, and a pair of paratypes taken by the writer at Patagonia, Arizona, May 21, 1931. Two male paratypes taken at the same place, May 10, 1931, and one female taken at Nogales, May 23, 1929. Nymphs and adults taken on the valley cottonwood (*P. wislizeni*).

The high narrow crest, the long humeral angles and the different shade of green will at once distinguish this species.

¹Types in the author's collection.

Telamona calva Ball, n. sp.

Smaller and darker than *gibbera*, the crest tall, upright with the dorsal margin nearly horizontal. Testaceous with a light line. Length ♀ 8 mm., ♂ 7 mm., width 4 mm.

Pronotum moderately long narrow with faint rugae. A tall narrow upright crest arising just back of the humeral angles as in *gibbera*, the anterior margin almost upright, rounding over to the nearly horizontal dorsum, which either rounds over to the slightly sloping posterior margin or else becomes oblique posteriorly and the dorsal margin meets the posterior margin in a slight angle. Crest no longer than in *gibbera* and the pronotum immediately behind it flattened, then arched and carinate before the acute apex. Humeral angles nearly right angled, narrower than in *gibbera* or *tarda*. Male inclined to be hairy with a narrow upright crest, lower than in the female, uniformly rounding above.

Color rich testaceous; the face and metapodium with a greenish cast, the central carina of the latter dark, anterior margin of crest narrowly light, posterior margin broadly so, the light areas bordered with dark.

Holotype ♀, allotype ♂, and two female paratypes taken by the writer June 24, 1931, on Blue Blossom (*Ceanothus thyrsiflorus*) growing on a bluff at Big Trees, California. This species should be placed between *gibbera* and *tarda*.

Xantholobus nigrocincta Van Duzee.

This species was described from a single female by Van Duzee and placed in the genus *Ophiderma*. The writer collected a fine series in 1930 and upon study discovered that the females show the three-humped outline of a *Xantholobus* quite plainly. The male differs from the female in color as is usual in this genus and is described below. Male smaller than female, black with white markings. Length 5 mm. Face, metapodium and pronotum back to the first inflation white, finely and thickly irrorate and punctured with black, omitting narrow white margins against which the black is emphasized, and increasing in depth of color on the pronotum until it becomes black with a posterior white band and a pair of lateral areas light. The elytral nervures are black; the legs black above, light below.

Allotype ♂, Huachuca Mountains, Arizona, May 4, 1930, taken by the writer.

Genus BAJULATA Ball, n. gen.

Resembling *Vanduzee* in size and venation with the pronotum bearing two extremely large inflations.

Metapodium about as in *Vanduzee*, the humeral angles more prominent and placed farther back. Pronotum sparsely pubescent, as seen from above similar in shape to *Vanduzee*; in profile with two humps like a bactrian camel, the anterior one situated just before the middle, slightly higher and more acute than the posterior one, which is considerably nearer the anterior one than the apex. The posterior portion of pronotum sloping from

base of inflation to the blunt apex, which about equals the apical cell. Elytra relatively short and broad. Venation similar to *Vanduzea*, the outer discal cell broad and only slightly curved, the apical short and broad, the base truncate with the petiole attached a little nearer the costal margin, thus forming a quadrangular second apical.

Type of the genus *Vanduzea bajula* Godg.

This genus bears about the same relation to *Vanduzea* that *Xantholobus* does to *Ophiderma* with the exception that in *Xantholobus* there are typically three inflated areas, an anterior and posterior inflation of about equal size with a smaller median one above and between. In *Bajulata* the anterior inflation appears to be absent and the median one to have increased in size.

Amastris lycioda Ball, n. sp.

Smaller, paler and with a lower arch than *obtegens* which it otherwise resembles. A small long oval pale green species. Length ♀ 4 mm.; ♂ 3 mm.

Metapodium not quite vertical and rounding over into the long low arch of the pronotum, which in turn rounds over to the blunt apex. The metapodium as seen from the front forms an equilateral triangle and the carinate dorsum of the crest is only slightly foliaceous posteriorly, the highest point about the middle instead of in front as in *obtegens*. Elytra scarcely exceeding the pronotum. Venation similar to that in *obtegens* except that the apical cell is larger with the petiole nearer the center than shown by Fowler for that species. Color uniform pale green, the males with venter and femora black.

Holotype ♀, allotype ♂, and five paratypes July 24, 1930, five paratypes August and September, all taken by the writer at Tucson, Arizona. This is the first representative of this tropical genus to be taken north of central Mexico. Its small size, green color, and long oval outline will at once distinguish it.

Amastris templa Ball, n. sp.

Resembling *lycioda* in form but slightly smaller, rounder, with a broader pronotum. Straw color (green in life). Length ♀ 3.75 mm.; ♂ 3 mm.

Metapodium rapidly rounding back to a point back of the humeral angles, where it joins the arch of pronotum without a sinuation. Pronotum as seen from side lower and more uniformly rounding than in *lycioda*. Apex much broader and more bluntly rounding than in *obtegens* or *lycioda*. As seen from in front the metapodium is roundly narrowing above, the pronotum broader and flatter than in *lycioda* with only traces of a carina. The elytra are broader and there are usually extra cells along the costa. The apical cell is small and rests against the costa rather than the apex, the base is obtusely angled and the petiole short.

Color pale powdery green in life, fading to straw yellow, the venter and femora black in the male.

Holotype ♀, allotype ♂, and ten paratypes taken by the author at

St. George, Utah, May 17, 1913. The broader form, more uniform oval and the small cells along costa will readily separate this species.

***Publilia modesta* var. *brunnea* Ball, n. var.**

Form and structure of *modesta* nearly the metapodium rounding back and joining the crest without an angle or sinus. Pronotum smooth, polished, without lateral carinae and with a long acute apex. Color uniform shining mahogany brown. Length ♂ 4.3 mm.

Holotype ♂ and one paratype ♂ Trinidad, Colorado, August 8, 1925 (C. J. Drake), one paratype ♂ Ames, Iowa, May 15, 1897, taken by the author. This may prove to be a distinct species when its life history and food plants are determined. Variety *reticulata* V. D. appears to be a distinct species with an almost vertical metapodium forming a definite angle with the dorsal line, instead of rounding over as in *modesta*.

***Stictopelta caerulea* Ball, n. sp.**

Slightly larger and broader than *nova*. Brownish olive above with lateral caerulean crescents. Length 7-8 mm., width 4.2 mm.

Metapodium broader and flatter than in *arizona*, rounding into the broad flat dorsum of the pronotum, much less arched than in *nova*, face relatively shorter and broader than in either species, lateral angles broad as in *nova*. Apex of pronotum as seen from side rounding up from below to a blunt tip.

Color pronotum pale olive brown in female, dark olive brown in the male, with the lateral margin from the humeral angle to just before the apex broadly marked with a caerulean blue stripe, the upper boundary of which is arched. The base of metapodium with a white line which extends to the humeral angles.

Holotype ♀, allotype ♂, and eight paratypes, September 22, 1929, four paratypes, September 19, 1930, and one October 10, 1931, all taken in Sabino Canyon near Tucson, Arizona, by the author.

This is a strikingly distinct and beautiful species allied to *varians* of Fowler but differing in color.

***Sticopelta pulchella* Ball, n. sp.**

Shorter and broader than *nova* with a higher pronotum. Olive brown (female), or dark brown (male), with two transverse white bands enclosing small black spots. Length 6-7 mm., width 4 mm.

Metapodium higher and more upright than in *caerulea*, the pronotum higher and shorter, therefore more arched as seen from the side. The humeral angles broad and rounding. Apex of pronotum broad, abruptly narrowed from both sides.

Color, female with the pronotum pale olive green, a broad irregular margined transverse white band just before the dark brown apex, another interrupted white band between this and the humeral angles. The latter appears as a pair of broad white triangles that do not reach the median

line above. These white areas with a few rather large round dark spots. Male brown to dark brown or pitchy with the same white areas.

Holotype ♀, allotype ♂, and four pairs of paratypes, Baboquivari Mountains, September 19, 1931, six paratypes Sabino Canyon, September 22, 1929, all taken by the author. Another beautiful and distinct species.

***Scalmophorus minutus* Ball, n. sp.**

Resembling *reticulatus* but smaller, narrower with the horn bluntly rounding instead of pointed. Uniform pale cinnamon brown. Length 5–6 mm., width scarcely 1 mm.

Face and metapodium in the same plane, the metapodium gradually and regularly narrowing to the slightly foliaceous apex of the horn with only a trace of a carina. Horn as seen from the side extending upwards at a very slight angle, straight or very slightly curved downwards at the apex. Horn as long as the remainder of the pronotum, gradually tapering to a bluntly rounding apex one-half as wide as the base. Pronotum back of horn very low, slender and tapering to the apical cells, with a single strong carina on the apical portion. Venation slightly reticulate with a petiolate apical cell of varying size. Color uniform cinnamon with only the eyes darker.

Holotype ♀, allotype ♂, and one paratype taken by the writer on Chihuahua Pine (*P. leiophylla*), Chiricahua Mountains, August 23, 1931.

***Hypsoprora nogolata* Ball, n. sp.**

A small straw-colored species with brown mottling. The pronotum long slender and strongly bisinuate, the dorsal process short, nearly upright, much inflated. Length of body 3 mm., of process in female 2 mm., in male, 1 mm.

As seen from the front the dorsal process is slightly more constricted above the metapodium than in *anatina* and less than half as long, only slightly longer than the metapodium or face in the female and still shorter in the male. From the side the dorsal process in the female is inclined anteriorly but is shorter thicker and more upright than in *simplex*, while the posterior processes are similar. In the male it is very short, about half the height of the metapodium, upright in front and overhanging behind with a faint carina in both sexes. The elytra are coriaceous on the basal half and deeply pustulate, the pustules extending farther along the nervures. The venation is irregularly reticulate.

Holotype ♀, allotype ♂, and six paratypes, Nogales, Arizona, September 20, 1931. Eight paratypes, Tombstone, Arizona, June 14, 1932, all taken by the author on the Desert Broom (*Baccharis sarothroides*), and only on clumps growing singly on dry hills.

***Microcentrus lynx* Ball, n. sp.**

Resembling *perdita*, slightly longer and slenderer, with the dorsal processes taller, parallel margined and overhanging in the female. Color

brown but appearing almost silver gray owing to the heavy white pubescens. Length 8 mm., width 2.6 mm.

Much smaller and narrower than *schaefferi*, with the super-humeral smaller and more upright in the female, spreading, acute and spine-tipped in the males. As seen from the front the superhumeral in the female are almost upright on their outer margins and do not equal the humerals, while in *schaefferi* they overhang the humerals by more than the width of those processes. In the male the superhumeral are lower and much more flaring, almost horizontal at the apex and slightly wider than the humerals. As seen from above the male superhumeral are wing-like, angled in front and emarginate behind with an acute tip like the ear of a lynx. Posterior process more strongly arched and crested than in *perdita*, less so than in *schaefferi*. Face with a pair of conical protuberances on the upper margin above the ocelli. Color pearly gray due to a heavy pilosity over a cinnamon brown base. Minute brown spots on wings.

Holotype ♀, allotype ♂, and four paratypes, Palmer Lake, Colorado, July 23, 1900, a pair of paratypes, Durango, Colorado, August 3, 1900, all taken from low mat-like clumps of oaks (prob. *Q. gambelli*), by the author.

In general the humeral of *schaefferi* extend forward while the foliaceous portion is vertical, and in this species they extend upward and the foliaceous portion is horizontal.

***Microcentrus aurtus*, Ball, n. sp.**

Resembling *lynx*, slightly stouter, darker, the superhumeral in the female longer, more inclined forward and expanded towards apex, chocolate brown with a light sheen. Length 8-9 mm., width 3 mm. Color of *schaefferi* nearly smaller with the superhumeral in the female extending obliquely forwards and outwards in a straight line much longer and more expanded at apex than in *lynx*, with the posterior (upper) half obliquely shorter than the anterior lobe. Male superhumeral almost horizontal, inclined forward more than in *lynx*, and wider toward apex with a similar spine-like tip. Posterior process of same length and with a node-like crest at each end as in *lynx*. Upper margin of face with a pair of conical protuberances as in *lynx*.

Holotype ♀, allotype ♂, and one paratype Huachuca Mountains, Arizona, June 15, 1930, paratypes Chiricahua Mountains, July 5, 1930, August 23, 1931, Santa Rita Mountains, January 30, 1929, July 13, 1930, and two from Granite Dells, Oct. 6, 1929, all taken on oaks by the author.

***Microcentrus nicholi* Ball, n. sp.**

Much smaller and more fragile than *lynx*, with small slender superhumeral in the female and only low carinae in the males. Color yellowish testaceous. Length 6-7 mm., width 1.7 mm.

Face short, sharply retreating on a line below the eyes, thus appearing still shorter. Projections on the upper margin above the ocelli broadly angularly protuberant. Metapodium with a definite shelf back of frontal

projections, then upright to the truncated-cone-like dorsum, the margins slightly carinated and dark lined in the male, the lateral margins obliquely elevated into long triangular projections which are again dark lined in the female. Posterior process short as in *caryae*, only slightly exceeding the forks of the scutellum. Elytra with the clavus and the corium back to the cross nervures entirely coriaceous and heavily pustulate, beyond this point hyaline. The ovipositor and pygofer are extremely long and slender and the female segment is only broadly excavated. Color testaceous, paler behind the superhumeral and across the base of the clavus, the posterior process white with a black tip.

Holotype ♀ and one paratype ♀ taken on pine in the Chiricahua Mountains, June 20, 1928, by A. A. Nichol. Allotype ♂ and one paratype ♂ taken by the writer from *Pinus leiophylla* in the same place, August 23, 1931, named in honor of Mr. A. A. Nichol, whose observations on food plants and life histories of Homoptera have proved to be exceptionally accurate and valuable.

Enchenopa permutata Van Duzee.

Van Duzee described this species in 1908 from 10 females from St. George, Utah, and two females from Arizona. He called attention at the time to its characters as intermediate between *Enchenopa* and *Leioscyta* and stated that he formerly considered it as the female of *L. ferrugipennis* var. *testacea*.

This species is common on *Lycium wrightii* in southern Utah and Arizona and the writer has collected hundreds of examples in each area trying to find a male with the dorsal horn like the female. Instead, he has found that all the males are without horns, and that many of the females are hornless. While the rest of the females possess definite horns which vary somewhat in size and in the angle of projections but do not grade down to the hornless condition. The hornless forms are typical representatives of *Leioscyta* and resemble *testacea*. They are, however, quite distinct from that form as represented by the types from Rifle and Grand Junction, Colorado. The writer has collected *testacea* in abundance on greasewood (*Sarcobatus vermiculatus*) in western North Dakota, Colorado, Utah, Nevada, and California as far south as the Mojave Desert. He has not taken it in extreme southern Utah or in Arizona, and has never found a horned female. It is likely that the examples of *testacea* that Van Duzee cites from St. George, Utah, and Arizona, were really the hornless forms of *permutata*.

In 1929 Goding redescribed the horned female as *Tritropidia utahensis* from a single female from Santa Clara, Utah. This location is only a few miles from St. George, the type locality of *permutata*. In the same paper he redescribed the hornless form as *Leioscyta trinotata* from a single female from Millican, Utah. The female of this remarkable species appears to have had entirely too much attention while the male has not been mentioned; it may be characterized as follows:

Male resembling the unarmed female, smaller and usually darker, the angle of the metapodium and dorsum very slightly acute but the apex is

broadly rounded with the carina less prominent than in *testacea* or *nitida*. The anterior sinuation on the dorsum either weak or wanting as it is in the unarmed female.

Color varying from soiled straw to dusky brown, an oblique pale band across the pronotum and elytra in the region of the cross nervures emphasized and black bordered on the pronotum. Length 4-4.5 mm.

Allotype ♂, St. George, Utah, May 17, 1913, taken by the writer on *Lycium*.

***Tylocentrus reticulatus* Van Duzee.**

This species was described from southern Utah and Arizona, where it occurs commonly on the mesquite. Goding has recently redescribed it as *Orthobelus felinus* from an Arizona female. It is certainly entirely out of place in the West Indian genus *Orthobelus* even if it had not been made the type of *Tylocentrus*.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW GECKO FROM HAITI, *ARISTELLIGER*
EXPECTATUS.

BY DORIS M. COCHRAN.

The discovery of a new species of *Aristelliger* on Navassa Island by Major Chapman Grant¹ and the description of a related form from Great Inagua Island by Dr. Noble and Mr. Klingel² have prompted me to re-examine the rather scanty material of that genus from Haiti. In accordance with Dr. Noble's prediction that a related form might be expected to occur in Haiti, I have found that a small gecko, which I had assumed was the young of *Aristelliger lar*, in reality represents a new species, linked closely to the Navassa and Inagua species because of the similarity of their toe structure. I shall therefore call this new gecko

Aristelliger expectatus, new species.

1928. *Aristelliger lar* (not of Cope) Cochran, Proc. Biol. Soc. Washington, vol. 41, Mar. 16, 1928, p. 54.

Description of the type.—U. S. N. M. 75908, an adult male from Jacmel, Haiti, collected in 1928 by J. S. C. Boswell on a low palm tree. Rostral much broader than high, with a posterior median cleft extending forwards for one-half the height of the shield, in contact above with the supranasal and the single internasal; nostril rather large, touching the outer posterior border of the rostral, its lower rim widened and in contact with the first supralabial, posteriorly bordered by two postnasal scales, the upper the smaller; about seven upper and five lower labials to a point below the center of the eye, the few behind this point becoming smaller (the upper labials on both sides have suffered a slight injury); upper surfaces covered with granular scales which are smaller middorsally, larger on the flanks and on

¹"A new species of *Aristelliger* from Navassa" by Chapman Grant, Journ. Dept. Agr. Porto Rico, vol. 4, No. 4, Oct. 1931, pp. 399-400.

²"The reptiles of Great Inagua Island, British West Indies," by G. K. Noble and G. C. Klingel, Amer. Mus. Nov., No. 549, Aug. 11, 1932, pp. 4-11.

the snout, and largest on the tail where they merge into overlapping hexagonal scales arranged in symmetrical transverse rows; about 27 lateral scales and about 30 dorsal scales equal to the distance between tip of snout and center of eye; canthal scales not particularly enlarged; eye a little nearer to ear than to end of snout, its diameter not quite half the length of the snout; 5 or 6 superciliary scales on the eyelid, the last one projecting as a short palpebral spine above the eye; ear-opening irregularly oval, its greatest diameter about once and a half the height of the first supralabial, its distance from the eye equal to the distance between eye and nostril; temples very minutely granular; mental broad, triangular, considerably wider than the rostral, its labial margin almost three times as wide as the first infralabial; two pairs of chinshields, the inner ones in contact with each other behind the mental, the scales following these and bordering the infralabials small, rather abruptly merging into the minute granules which cover the entire throat; remainder of underside of body and legs covered with smooth, cycloid, imbricate scales; about 14 abdominal scales included in the distance between end of snout and center of eye; the scales on underside of thighs grading down to very small ones; no femoral pores; the scales beneath the tail large, rectangular, arranged in transverse rows, each one equivalent to two of the upper caudal rows in length and much wider than long; fingers and toes slightly but definitely webbed, all with long, angularly raised and clawed distal phalanges, those of the third and fourth fingers and the three outer toes compressed, those of the first, second and fifth fingers and the first and second toes with an enlarged pad-like scale nearly covering the side of the claw, the first finger and toe with an additional smaller pad-like scale on the other side of the claw; basal dilated portion with 11 single lamellae under the fourth toe and 9 under the fifth toe; tail cylindrical, distinctly compressed towards the reproduced tip.

Dimensions.—Head to posterior border of ear, 15 mm.; head and body, 51 mm.; tail (reproduced), 59 mm.

Color in alcohol.—Above drab gray; a seal brown stripe originating behind the nostril, continuing on the lores, passing well above the ear-opening and widening above the shoulder as an enlarged blotch; behind this blotch a fainter continuation of the lateral stripe which becomes very irregular posteriorly and fades out on the sides of the tail; six or seven very narrow dorsal bars between these lateral stripes, the anterior interrupted in the middle and ending as a forward-curving blotch on each side of the nape, the remaining bars somewhat similar in shape but paler; a faint irregular roundish marking on the occipital region; traces of wavy crossbars on the upper limb surfaces; upper and lower lips minutely spotted with pale dots; lower surfaces immaculate pale olive buff darkening slightly below the tail.

Paratypes.—M. C. Z. 25425, from Pte. à Raquette, Gonave Island, collected in 1927 by W. J. Eyerdam, is similar to the type in proportions and generally in coloration, although the pattern of dorsal crossbars is stronger than in the type specimen, and the entire body is darker in hue. The upper and lower labials are dark, and the lower surface of the body is heavily powdered with gray dots. This paratype has six upper and six lower labials on the right side of the head to a point beneath the center of the eye; on the

left side of the head there are seven upper and six lower labials. The chinshields in this specimen fail to meet behind the mental, being separated by a single small scale. The postnasals are much smaller and more irregular. There are about 16 ventral scales and 26 lateral and 28 dorsal granules in the distance between tip of snout and center of eye. M. C. Z. 13847, also from Gonave Island, collected in 1919 by G. M. Allen, is very pale in color and practically devoid of pattern except for a faint suggestion of the wide stripe along the side of the head and neck. It has six upper labials on both sides, six and five lower labials on right and left respectively; the chinshields fail to meet, being separated by one scale; the postnasals are small, numerous and regular, and there are about 13 ventral scales and 23 lateral and 26 dorsal granules in the distance between tip of snout and center of eye. A third paratype, M. C. Z. 13322 from Thomazeau, Haiti, collected in 1919 by G. M. Allen, is very similar to the type in coloration, except that in this paratype the dark bands on the limbs are somewhat more heavily accentuated. This individual has six upper and five lower labials on both sides of the head; the chinshields are in contact behind the mental; there are but two postnasals, and these are relatively large, followed by much smaller granules; there are about 13 ventral scales and 24 lateral and 28 dorsal granules in the distance between tip of snout and center of eye.

Relationships.—As I have already indicated, the new species is very close to the Navassa and Great Inagua species because of their similarity in the arrangement of the terminal phalanges of the digits. From *Aristelliger cochranæ* of Navassa the new species differs decidedly in color pattern, in having a somewhat longer snout, and in having larger granules on top of the snout and between the eyes as well as on the back. From the Great Inagua form, which Noble and Klingel named *Aristelligella barbouri*, the Haitian species differs in having more lamellæ under the toes, and apparently also in having a weaker color pattern.

These three species differ from *Aristelliger lar* of Hispaniola, *A. praesignis* of Jamaica and *A. irregularis* of Cozumel in having more of the digits with "friction pads" at their terminations.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

AN UNDESCRIBED JACK-RABBIT, GENUS *LEPUS*,
FROM CARMEN ISLAND, GULF OF
CALIFORNIA, MEXICO.¹

BY WILLIAM HENRY BURT.

In the spring of 1930, when Mr. Harry H. Sheldon visited Carmen Island, in the Gulf of California, Mexico, he collected an adult female black-tailed jack-rabbit which differed appreciably both in skull and skin characters from the jack-rabbits occurring opposite on the mainland of Lower California. In January, 1932, the writer obtained three additional specimens from Carmen Island, the four specimens now being in the collections at the California Institute of Technology. In my opinion the island specimens differ sufficiently from the known races of jack-rabbits to warrant distinction by name. It is a pleasure to name this island race for Mr. Harry H. Sheldon, who collected the first specimen from the island.

***Lepus californicus sheldoni*, subsp. nov.**

CARMEN ISLAND JACK-RABBIT.

Type.—Female adult, skull and skin; no. 18061, collection of Donald R. Dickey; Carmen Island [(latitude 26° north, longitude 111° 12' west), Gulf of California], Lower California, Mexico; March 22, 1930; collected by H. H. Sheldon; original no. 6338.

Measurements of type.—Total length, 560 mm.; tail vertebrae, 95; hind foot, 118; ear (from notch, dry), 126. Skull: basilar length of Hensel, 70.9; length of nasals, 37.5; breadth of rostrum at posterior termination of premaxillae (taken from outer borders of frontal processes lateral to premaxillary tongues), 20.8; depth of rostrum in front of premolars, 20.1; interorbital width (including supraorbital processes), 26.7; least interorbital width, 12.8; parietal width of skull, 30.6; diameter of audital bullae, 14.6.

¹Contribution from the California Institute of Technology.

Distribution.—Known only from Carmen Island, Gulf of California, Mexico.

Characters.—A moderately dark-colored race of the *californicus* group of jack-rabbits, as defined by Nelson (North Amer. Fauna No. 29, pp. 126–128, 1909), with large audital bullae and with frontal area depressed below plane of supraorbitals. Differs from *Lepus californicus xanti* Thomas, as represented by specimens from Cape San Lucas, Los Burros, and Delores Bay, Lower California, in more nearly iron gray coloration with only a trace of the pinkish buffy of the upperparts which is so noticeable in *xanti*, in larger, more inflated audital bullae, and in more depressed frontal area in region of supraorbitals. Skull similar to that of *Lepus californicus martirensis* Stowell, but relatively and actually broader with larger bullae. Differs from *Lepus californicus magdalenae* Nelson chiefly in darker, less buffy, coloration and larger size.

Remarks.—Jack-rabbits were seen only at the north end of Carmen Island, particularly along the foothills east of the salt works where there was a rather dense growth of mesquite.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SWIFT OF THE GENUS *REINARDA* FROM
VENEZUELA.

BY J. H. RILEY.¹

Several years ago the United States National Museum acquired a single specimen of *Reinarda* collected in the Brazilian state of Ceará. Later when a series of six specimens were received from the National Geographic Society collected on the Brazo Casiquiare, Venezuela, it was at once apparent that two forms were represented. Lately to clear the matter up, the American Museum of Natural History has kindly lent me a series of this genus from northeast Brazil and the Academy of Natural Sciences of Philadelphia has forwarded the type of *Cypselus squamatus* Cassin. To the authorities of both institutions I wish to extend my thanks.

An examination of the above type shows that the Venezuelan form is the one requiring a name. It may be known as

***Reinarda squamata semota*, subsp. nov.**

Type.—Adult female, U. S. National Museum, no. 326,806, El Mango, Brazo Casiquiare, Venezuela, February 5, 1931, collected by Holt, Blake, and Agostini (original number 4988).

Similar to *Reinarda squamata* (Cassin), but the upperparts a shining greenish black instead of brownish black; the pectoral band broader and darker; the feathers of the throat and center of the breast only fringed with white, the dark bases of the feathers showing plainly and predominating instead of being predominantly white; under tail coverts a shining greenish black with only a very narrow white fringe on the inner web instead of nearly the whole inner web being white and the outer web sometimes narrowly edged with white. Wing 106; outer tail feather 71; middle tail feather 31.5 mm.

Remarks.—The U. S. National Museum received six specimens collected

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on the Brazo Casiquiare, Venezuela, by the National Geographic Society's Brazil-Venezuelan Expedition. I am indebted to the authorities of the American Museum of Natural History for the loan of eleven specimens of *Reinarda* from the states of Bahia, Piahy, Parahyba, and Ceará, Brazil, and to the authorities of the Academy of Natural Sciences of Philadelphia for the loan of the type of *Cypselus squamatus* Cassin. The U. S. National Museum previously to the receipt of the Venezuelan series possessed only a single specimen of *Reinarda* from the state of Ceará, Brazil. It is a very light colored specimen with scarcely any light edging to the feathers of the back; in fact, it is much lighter than any specimen in the American Museum series mentioned above. It is so light that it is either aberrant or a very old bird. All the other specimens from Brazil have the feathers of the upperparts more or less fringed with whitish. In the Venezuelan series the upperparts are much less heavily fringed with whitish; in fact in the type of *semota* the light edges to the upperparts are very faint; it is the only one in the series marked as adult. In the series examined from Brazil all, except one, of the specimens have the under tail coverts predominantly white while in *semota* this area is predominantly black. The Venezuelan series is fairly uniform; the type has the edges to the feathers of the upperparts less prominently fringed with whitish. The type of *Cypselus squamatus* Cassin agrees with the series from Brazil rather than with that from Venezuela. Cassin says that his type was presented to the Academy by Dr. Henry G. Dalton of Georgetown, British Guiana, who stated it was a common resident bird in that country. The species has been recorded from Peru, but birds from there will almost certainly prove to be different from the more eastern birds.

There appears to be no appreciable difference in size between the Venezuelan and Brazilian series.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RACE OF POCKET GOPHER FOUND IN
OREGON AND WASHINGTON.

BY E. RAYMOND HALL AND ROBERT T. ORR,
Museum of Vertebrate Zoology, Univ. of California, Berkeley, Calif.

Knowledge of the existence in the Museum of Vertebrate Zoology of the series of topotypes, obtained in 1930 by Miss Annie M. Alexander and Miss Louise Kellogg, of the several kinds of pocket gophers named from eastern Washington and Oregon, induced one of us (Orr), when visiting that region, to direct special effort toward obtaining additional specimens, from other localities, judged as probably of importance in contributing to a better understanding of the genus *Thomomys* there. One result of this effort was the taking of certain specimens, in the Wallowa Mountains of Oregon, which, when studied together with other specimens previously taken from the same mountain mass, give basis for recognition of the heretofore unnamed geographic race described below.

***Thomomys quadratus wallowa*, new subspecies.**

Type.—Male, adult, skin-and-skull; no. 54701, Mus. Vert. Zool.; Catherine Creek, seven miles east Telocaset, 3500 feet altitude, Union County, Oregon; June 29, 1932; collected by Robert T. Orr; original no. 570.

Range.—Wallowa Mountains of northeastern Oregon and adjoining mountains in southeastern Washington.

Diagnosis.—Size: small (see measurements). Color (summer pelage): near (1) Snuff Brown¹ above; sides lighter (more grayish); underparts washed with Cinnamon Buff; hind feet and tail whitish. Skull: rostrum short and broad; premaxillae extending considerably behind nasals; zygomata nearly parallel but not broadly expanded; tympanic bullae small; dorsal margin of foramen magnum evenly rounded; maxillary arms of zygomata abruptly depressed.

Comparisons and relationships.—As compared with the geographically adjacent *Thomomys columbianus* Bailey, *T. q. wallowa*, cranially, is smaller with less well developed temporal ridges, in side view has the maxillary

¹Capitalized color terms after Ridgway: color standards and color nomenclature, 1912.

arm of the zygoma not as nearly vertical, has relatively less inflated tympanic bullae and the tip of rostrum less depressed. The two last mentioned characters show approach to *T. q. quadratus*, from which *wallowa* differs in smaller size, less well developed temporal ridges, less widely expanded zygomatic arches, more inflated tympanic bullae and in having the maxillary arms of the zygomata, in side view, not as nearly vertical.

Selected differences of *T. q. wallowa*, from *Thomomys fuscus fuscus* (specimens from Smith Mountain, Adams County, Idaho) are as follows: Auditory bullae less inflated ventrally and in mastoid portion; maxillary arms of zygomata more nearly vertical; rostrum relatively, as well as actually, shorter and broader; premaxillae extending farther behind nasals; dorsal margin of foramen magnum, without, rather than with, distinct indentation. The three last mentioned characters are ones in which *wallowa* agrees with *T. q. quadratus*. The two first mentioned features are ones in which *wallowa* is intermediate as between *quadratus* and *fuscus*. Other features in which *wallowa* resembles *fuscus* and departs from *quadratus* are: small size; narrow braincase; and narrowness across the zygomatic arches.

Four specimens, two of which are young, from Ochoco Ranger Station, 4000 feet altitude, Crook County, Oregon, deserve mention in the present connection. The locality is geographically intermediate as between the territories known to be inhabited by *quadratus* and *wallowa*. The skulls of the two adults are intermediate in general size as between *wallowa* and *quadratus* and the degree of inflation of the tympanic bullae is intermediate as between these two forms. The braincase is wider as in *quadratus*. Indeed the skull throughout is relatively wide as in *quadratus* and further agrees with that form as regards the nearly vertical position of the maxillary arms of the zygomata. The specimens are referred to *quadratus*. At the same time, they are regarded as in the nature of intergrades toward *wallowa* and on this account we think justify use of the specific name *quadratus* with the here newly proposed name *wallowa*.

T. q. wallowa itself is intermediate in cranial characters as between *quadratus* and *fuscus*. In fact, it stands very near the center of the gap which separates the two forms. By one line of reasoning these structural features of *wallowa* might justify uniting *fuscus* and *quadratus* as subspecies of a single species. However, a gap of some size, even though only about half as great as formerly thought, still exists between *fuscus* and animals of the *quadratus* type. If, and when, intermediates are found between *fuscus* and *wallowa*, as we have just described from Ochoco Ranger Station, between *quadratus* and *wallowa*, then we should have but little hesitancy in treating *quadratus* and *fuscus* as geographic races of one and the same species. However, we have seen no specimens from intermediate localities which bridge the gap between the long, narrow rostrum of *fuscus* on the one hand and the short, wide rostrum of *quadratus* and *wallowa* on the other.

Specimens examined.—Total number, 8, as follows: Anthony, Baker County, Oregon, 4; Catherine Creek, seven miles east of Telocaset, 3500 feet altitude, Union County, Oregon, 2; twenty-five miles southeast of Dayton, Blue Mountains, Columbia County, Washington, 1; Humpeg Falls, Columbia County, Washington, 1.

MEASUREMENTS, IN MILLIMETERS, OF FIVE ADULT SPECIMENS OF *Thomomys quadratus walloua*.

Catalog no.	Sex	Locality	Total length	Length of tail	Length of hind foot	Basilar length	Length of rostrum ²	Length of nasals	Zygomatic breadth	Mastoid breadth	Least interorbital breadth	Alveolar length of upper molar series	Breadth of rostrum
21199	♀	Columbia Co., Wash.	190	52	27	—	15.4	12.7	—	—	6.4	7.6	6.7
Type	♂	Union Co., Ore.	188	54	25	31.7	15.3	12.3	19.9	17.2	6.6	7.1	7.3
3709	♂	Baker Co., Ore.	185	56	26	30.0	—	—	—	16.6	6.7	6.7	6.5
3711	♂	Baker Co., Ore.	188	65	25	30.0	14.2	11.1	18.8	15.9	6.2	6.8	6.4
3712	♂	Baker Co., Ore.	198	64	26	31.5	—	—	20.0	17.6	6.1	6.6	6.6

²Length of rostrum as here given was taken from the middle of the anterior border of the nasals to the maxilla at the lateral end of the base of the lacrymal process.

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NEW AMERICAN VELIIDAE (HEMIPTERA).

BY C. J. DRAKE AND H. M. HARRIS,
Ames, Iowa.

The present paper is based upon material belonging to the U. S. National Museum, the Carnegie Museum (Pittsburgh), and the private collection of the writers. It contains descriptions of six species of *Rhagovelia*, six species and a variety of *Velia*, and three species of *Microvelia*. The place of deposition of the types is indicated after the description of each species.

Velia capillata, n. sp.

Brown to dark brown, the pronotum darker, sometimes blackish; rather densely clothed with long, erect, fine, brownish hairs. Head brown, hairy, with the usual impressed lines and a large fovea on each side above. Antennae long, slender, rather thickly clothed with both long and short hairs; proportions, 35 : 20 : 42 : 45. Rostrum reaching almost to middle coxae. Pronotum coarsely and deeply pitted, sometimes with an indistinct median carina, the sides constricted before the middle, the base rounded behind, the humeri quite prominent. Hemelytra infusate, the veins prominent and paler, an irregular longitudinal patch at the base and a rounded spot on each side of membrane near apex whitish. Body beneath brown. Legs fuscous brown, tending to be lighter toward base, rather long, very hairy; the tarsi of intermediate legs with the basal segment short, and the apical about as long as the other two conjoined.

Male.—The last segment of venter subequal in length to preceding one, its apical margin deeply excavated. Clasper long, strongly bowed, its apical portion flattened and expanded. Pronotum not as broadly rounded behind as in female.

Length, 4.2 mm.; width, 1.73 mm.

Holotype, macropterous male; *allotype*, macropterous female, Chapada, Brazil; Carnegie Museum. *Paratypes*, several males and females taken with types, in collection of the authors and Carnegie Museum.

Velia capillata, var. *cognata*, n. var.

Form, color, and clothing similar to typical variety from which it

differs in size and possession of annulate legs. Antennal proportion, 50 : 38 : 45 : 55. Length, 5.61 mm.; width, 2.02 mm.

Holotype, macropterous male, Maranhao, Brazil, writers' collection.

***Velia hungerfordi*, n. sp.**

Dark brown, legs and antennae paler, each hemelytron with an elongate stripe on basal third and a slightly broader and shorter stripe along median line at apex white. Head with the usual impressed lines. Antennae moderately stout, apical segments slightly darkened; proportions, 32 : 26 : 28 : 33. Rostrum extending to end of mesosternum. Pronotum very coarsely pitted, with a fairly distinct raised median line, rather broadly rounded behind. Legs long, hairy, segments two and three of intermediate tarsi subequal. Sides of thorax and body beneath, except last segment of venter, deeply and coarsely pitted.

Length, 4.61 mm.; width, 1.76 mm.

Holotype, winged female, Chapada, Brazil; in collection of Carnegie Museum. *Paratype*, winged female, Brazil; in authors' collection.

The white markings on the elytra, the antennal proportions, and the pitted venter serve to identify this pretty species. It is named in honor of Dr. H. B. Hungerford, who has taken a very keen and active interest in the aquatic and semiaquatic Hemiptera.

***Velia kahli*, n. sp.**

Brownish black, the disc and anterior portion of pronotum brown; legs and antennae brown. Elytra with a basal streak and a rounded spot on disc of membrane whitish; upper surface sparsely clothed with long black hairs. Pronotum deeply pitted, with a median raised line, broadly rounded behind, the humeri prominent. Head black, with usual impressed lines. Antennae moderately long; proportions, 28 : 16 : 37 : 37. Rostrum extending slightly beyond middle of mesosternum. Legs clothed with short, recumbent hairs; intermediate tarsi with segments two and three subequal; hind femora bowed, slightly longer and thicker than intermediate. First genital segment of male strongly constricted, armed on each side with a flattened, triangular tooth, the hind margin deeply and broadly excavated at the middle, also with a distinct notch on each side. Last genital segment short and plump. Clasper broad, curved, constricted near the base and beyond the middle, the apex broad.

Length, 4 mm.; width, 1.2-1.4 mm.

Holotype, winged male and *allotype*, winged female, Chapada, Brazil; in collection of Carnegie Museum. *Paratypes*, 2 males and 3 females, taken with types, in collections of Carnegie Museum and the writers.

In this species the connexivum is indistinctly marked with paler at the basal angles of the segments and the edge is beset with numerous, short black spinules. The species is named in honor of Dr. Hugo Kahl, in charge of the insect collection at the Carnegie Museum.

***Velia parilis*, n. sp.**

Very similar to *V. kahli*, n. sp., but differing from it in the slenderer body and the structure of the male claspers. Pronotum dark brown to

brownish black, the disc with a large, elongate brown patch; median carina moderately distinct. Markings of hemelytra and antennal proportions as in *kahli*.

Length, 4 mm.; width, 1.2–1.38 mm.

Male.—Last segment of venter a little longer than preceding, truncate behind. First genital more deeply excavated behind than in *kahli*, the teeth smaller and narrower. Clasper long, curved, the apex sharply curved and pointed.

Holotype, winged male, and *allotype*, winged female, Chapada, Brazil; in collection of Carnegie Museum. *Paratypes*, male and female, taken with type; in authors' collection.

The female of this species is very difficult to separate from that of *kahli*, the male, however, has very differently constructed claspers.

***Velia nexa*, n. sp.**

Very similar to the two preceding species in size, form, and markings. Pronotum dark brown, the large central part of disc lighter; with a fairly distinct median carina, deeply and coarsely pitted, with a row of prominent pits on the collar as in above species, humeri prominent. Legs and antennae very dark brown. Head with usual impressed lines and pits. Antennal proportions, 30 : 18 : 35 : 35; last segment paler. First genital segment of male depressed on each side, with a broad, flattened ridge along median line, without teeth or lateral notches, the apex slightly excavated at middle. Clasper hairy, long, broad, stout, curved inwardly and narrowed and darkened toward the apex.

Length, 3.54 mm.; width, 1.35 mm.

Holotype, winged male, and *allotype*, winged female, Maranhao, Brazil, in authors' collection. This species belongs to the same section of the genus as *rotundanotata* Hungerford, but is darker in color than that species, with less prominent humeri, without spinules and with differently formed genital claspers. The genital characters are very different from those of *kahli* and *parilis*, n. spp.

***Velia splendoris*, n. sp.**

Apterous form.—Brown, the entire body conspicuously armed with short black spinules and somewhat sparsely clothed with long, fine, dark hairs. Head with the usual impressed lines, the spinules prominent and directed upward and slightly posteriorly. Antennal proportions, 25 : 18 : 22 : 28. Rostrum reaching beyond middle of mesosternum, its apex black. Legs testaceous to brownish testaceous, all femora rather thickly beset beneath with black spinules, the coxae and trochanters also with a few spinules. Intermediate legs with last tarsal segment distinctly longer than the preceding two segments together. Pronotum broadly rounded behind, rather coarsely pitted, with raised median ridge more distinct anteriorly; the front portion transversely raised behind collar. Connexivum moderately broad, the margins slightly bowed, the spinules slightly larger than elsewhere. Abdomen above with basal parts of segments two, three, and

four with closely set, large foveae. Sides of thorax deeply, coarsely pitted. Last segment of venter of male slightly emarginate behind. Genital segments short and plump, the clasper long, strongly bent near base, the distal part curved and somewhat foliaceous. Wing pads linear, reaching to third or fourth segment, white, the inner vein entirely and apex of outer one brown. Female slightly broader than male.

Winged form.—Brown, the pronotum with median ridge indistinct, humeri prominent. Hemelytra smoky brown, with an elongate patch near base and a rounded spot near middle of membrane white.

Length, 2.3–3.4 mm.; width, 1–1.2 mm.

Holotype, apterous male, and *allotype*, apterous female, Chapada, Brazil, in collection of Carnegie Museum. *Paratypes*, three males and one female, taken with types; in collections of authors and Carnegie Museum.

***Rhagovelia hambletoni*, n. sp.**

Apterous male.—Black, the sides of pronotum and body beneath with an aenous luster; clothed with fine pale to brownish hairs. Basal portion of first antennal segment, coxae and trochanters of front and hind legs, base of front femora, and edge of intermediate acetabula pale to testaceous. Antennal formula, 39 : 22 : 26 : 25. Pronotum short, about one-fourth as long as broad, its hind margin slightly sinuate, the flavous spots fairly distinct. Mesonotum arched, a little shorter than broad, rounded behind. Connexiva slightly widened toward middle, the margins shiny, almost straight. Abdomen above with shiny patches on apical three segments. Venter with an indistinct median ridge toward base, the last segment black, nearly one and a half times as long as preceding, slightly depressed on each side of median line near the posterior margin, its apical margin slightly excavated. Genital segments plump, the last segment above bluntly rounded at apex. Intermediate legs, 77 : 59 : 36 : 36. Posterior femora slightly enlarged, armed beneath near the middle with a long, sharp, backward pointed tooth and from there to apex with seven or eight much shorter teeth, these diminishing in size toward apex. Posterior tibia with a short apical spur.

Apterous female.—Color, markings, and clothing similar to male. Connexivum broad, strongly reflexed behind, the basal segments clothed along inner margin with long brown hairs, the apex slightly raised and clothed with a compact group of stiff hairs. Intermediate legs, 38 : 64 : 40 : 39. Posterior femora armed within at apical third with a prominent spine and sometimes from there to apex with three or four much smaller teeth. Venter slightly carinate down the middle, the last segment shiny black, its apical margin convexly sinuate.

Length, 3–3.4 mm.; width, 1–1.21 mm.

Holotype, apterous male; *allotype*, apterous female, Vicosia, Minas Geraes, Brazil, June 6, 1932, E. J. Hambleton; in collection of authors. *Paratypes*, several apterous males and females, taken with types. This pretty little species belongs to the group with short pronotum. It is named in honor of the collector, who is taking a keen interest in Brazilian insects.

Rhagovelia tantilla, n. sp.

Black, clothed with very fine brown pubescence, pronotum with a transverse yellowish-brown spot in front, its sides and the entire ventral surface, excepting last abdominal segment and genital segments, grayish; basal portion of first antennal segment, all acetabula, the anterior and posterior coxae and trochanters, and basal portion of front femora pale testaceous. Head with the usual impressed lines, vertex somewhat arched. Antennae moderately long, first segment strongly curved; formula, 30 : 18 : 20 : 21. Pronotum about one-third as long as broad, raised posteriorly. Mesonotum evenly arched above, without median impression, about three times as long as pronotum, somewhat rounded behind. Intermediate legs, 65 : 45 : 25 : 32. Posterior tibia straight, without evident spine at tip.

Length, 2.4–3 mm.; width, 1.1–1.2 mm.

Male.—Connexivum with outer margins slightly rounded, without pale markings. Posterior femora slightly incrassate, reaching slightly beyond apex of genital segments, with a long, fine, black spine at the middle within and with five or six regularly shorter spines before apex. Venter strongly convex, with longer hairs on median part; the last segment shiny, with faint median keel to each side of which it is slightly depressed. Genital segments short and plump, the last segment bluntly rounded behind. Clasper short and broad.

Female.—Hind legs with femora slightly less swollen than in male and the spines a little smaller. Abdomen smooth above, without hairy coating except on basal two segments, the apical two segments with shiny patches. Connexivum broadest at middle, quite hairy along the sides and at apex. Last segment of venter shiny, terminal genital segment broadly rounded.

Holotype, apterous male, and *allotype*, apterous female, Punta Gorda, British Honduras, in authors' collection. *Paratypes*, numerous apterous males and females taken with types.

This species is somewhat closely related to *regalis* D. & H., from which it may be separated by its smaller size, shorter appendages, more convex body, narrower head, less strongly widened thorax, and differently constructed claspers of male. In all females at hand the connexiva are turned up and the abdomen longitudinally depressed so as to form a trough-like depression on the dorsum.

Rhagovelia plana, n. sp.

Apterous male.—Black, rather small, distinctly flattened, and narrowed posteriorly. Pronotum flattened, short, about one-fourth as long as mesonotum. Antennae moderately long, with bristly hairs as in other species; formula, 40 : 20 : 22 : 22. Connexivum not produced at apex, the margins shiny, nearly straight, and converging posteriorly. Intermediate legs, 80 : 52 : 36 : 33. Hind femora moderately incrassate, with a long spine near the middle and shorter spines from there to apex; shorter than tibia (60 : 66), the latter straight, with an indistinct spur at apex. Venter with last segment a little longer than the preceding, truncate at the apex. Genital segments plump, black. All acetabula, intermediate and posterior coxae, and trochanters pale.

Apterous female.—Mesonotum not so strongly depressed as in male. The hind femora not quite as incrassate as in male, armed as there. Connexivum much broader than in male, the outer margin rounded and becoming quite hairy posteriorly. Tip of abdomen also hairy.

Length, 2.8–3 mm.; width, 1.2 mm.

Holotype, apterous male, and *allotype*, apterous female, Punta Gorda, Br. Honduras; in authors' collection. *Paratypes*, numerous apterous males and females taken with types. This species is closely allied to *regalis* D. and H. and *tantilla*, n. sp. It may be recognized by its depressed form and short legs. The female of the latter has a peculiarly formed abdomen that will aid in its identification.

***Rhagovelia ainsliei*, n. sp.**

Apterous male.—Black, the margins of connexivum, basal portion of first antennal segment, and all coxae and trochanters testaceous to flavous. Body finely pubescent, also with short brownish hairs, the legs with longer pale hairs in addition to blackish bristles. Antennae moderately long; proportions, 50 : 32 : 23 : 22. Head black, with the usual impressed lines. Pronotum with bristly hairs along its sides, the disc deeply and coarsely pitted, with a fairly distinct median longitudinal carina, the front and sides plumbeous, with an indistinct testaceous spot on each side before apex, as long as broad, the base rounded, covering mesonotum. Connexivum with margins nearly straight, tapering regularly to apex. Anterior trochanters armed with a short, brownish spine before apex. Proportion of intermediate legs, 104 : 68 : 45 : 42. Hind trochanters with a few small, black teeth. Hind femora moderately to strongly incrassate, armed at basal two-fifths with a long, backwardly projecting spine-like tooth, from there to apex with a double row of short teeth, the base before long tooth also with a row of short teeth. Posterior tibia nearly straight or sometimes distinctly sinuate, armed within with short, stout teeth, those at apical third often much larger than others, the apex with a stout spur. Venter sharply carinate down the middle on basal two segments, the last segment shiny, strongly impressed on each side of the broad, median, somewhat triangular portion. First genital segment conspicuously clothed with pale hairs; last segment above strongly mucronate. Clasper moderately long and broad.

Apterous female.—Color, markings, punctuation, and general body clothing as in male. Antennae, 48 : 29 : 21 : 20. Connexivum strongly reflexed against the sides of the abdomen, with long brownish hairs along basal margin, narrowed toward apex, the tips with tufts of black hairs. Last segment of abdomen fringed with long brown hairs. Last segment of venter brown, shiny, about twice as long as preceding. Posterior legs with femora moderately slender, armed before distal third with a slender tooth and with several smaller teeth from there to apex. Genital segments hairy, the last strongly mucronate.

Winged male.—Pronotum longer than broad, triangular behind, the tip raised and slightly produced, the median carina fairly prominent.

Winged female.—Pronotum produced behind into a long horn, this

curved downward, and its apical portion densely clothed with long, brown hairs.

Length, 3.8–4.1 mm.; width, 1.3–1.4 mm.

Holotype, apterous male; *allotype*, apterous female, Guatemala City, Guatemala, C. N. Ainslie, collector, in collection of the writers. *Morphotypes*, winged male, and *paratypes*, several winged and wingless males and females, all taken with types.

This species is perhaps nearest related to *R. spinigera* Champion. The intermediate femora of the females lack the strong constriction characteristic of that species, although they are somewhat compressed dorso-ventrally. The males may be discriminated by the spine on the trochanter, the nature of the last segment of venter, the hairy genital segment, the sharply pointed apical segment, and the more triangular base of pronotum of winged form.

Rhagovelia ignota, n. sp.

Winged male.—Size, form, color, and markings very similar to *R. spinigera* Champion. Antennal proportions, 40 : 22 : 21 : 22; intermediate legs, 80 : 60 : 26 : 38. Posterior femora moderately to strongly incrassate, armed as in *spinigera*. Venter carinate along median line in front and depressed on distal four segments; the last segment deeply and roundly excavated behind, with a very strongly raised prominent hump on each side, the crest of each hump being a little in front of the middle of the segment. First genital segment with the posterior portion beneath hairy and very greatly swollen. Clasper a little broader and less pointed than in *spinigera*. Pronotum strongly pitted, faintly carinate along median line, and angularly produced behind.

Apterous male.—Pronotum broadly rounded behind and not so distinctly carinate along median line. Connexivum with the margins nearly straight; bordered with brown. Hind femora strongly incrassate. Posterior tibiae straight, with a spur at apex.

Female.—Very similar to *R. spinigera* Champion. Pronotum a little longer, its sides in front more depressed, and in the apterous form the base not so broadly rounded behind. Legs constricted as in *spinigera*.

Length, 4–4.2 mm.; width, 1.5 mm.

Holotype, winged male, Chiquimula, Guatemala, June, 1930; in authors' collection. *Allotype*, winged female, Tegucigalpa, Honduras, August 18, 1918, F. J. Dyer, collector; U. S. N. Museum. *Paratypes*, two males and four females, taken with the allotype.

The male is recognizable at a glance by the peculiar structure of the apical segment of the venter and the hairy and strongly tumid first genital segment. As in *spinigera*, female specimens sometimes bear tufts of long hairs at the apex of the abdomen.

Rhagovelia cuspidis, n. sp.

Black, thickly clothed with fine golden pubescence, the front margin of pronotum, connexival margins, base of first antennal, prosternum, all coxae, anterior and posterior trochanters, base of anterior femora and part of hind femora testaceous to brownish testaceous. Head with the

usual impressed lines. Eyes large, coarsely faceted. Antennal formula, 45 : 25 : 27 : ?, the second segment with long hairs on dorsal surface, the third slightly expanded. Pronotum extending over mesonotum, broadly rounded behind, with an indistinct median ridge, with rather numerous indistinct, but deep punctures. Abdomen tapering slightly posteriorly, the margins nearly straight, terminating behind in prominent somewhat laterally projecting spine-like processes; last segment a little longer than preceding, with a patch above shiny, the apex truncate. Last genital segment ending in a long, sharp process. Legs moderately hairy, the anterior tibiae strongly compressed, somewhat expanded and shallowly excavated beneath. Intermediate legs long; formula, 102 : 76 : 35 : 38.

Apterous male.—Venter bluish black, clothed with longer hairs, last segment shiny black, strongly depressed behind, the apex truncate. Genital segments plump, the first segment carinate along median line at base. Clasper long, very broad at base, the terminal portion sub-cylindrical, of about equal width throughout, slightly curved inwardly, blunt at apex and about three times as long as basal portion. Hind femora rather strongly incrassate, reaching to genital segments, armed with nine or ten progressively shortened, black-tipped testaceous spines; the first of these is much longer than the others and situated slightly before the middle; also armed along the basal half, before the long spine, with a distinct row of closely set, black teeth and along the distal half, beneath the spines, with an irregular row of short, black teeth. Posterior trochanter with numerous short black teeth. Hind tibia nearly straight, armed within with numerous short black teeth, the apex with a long, stout, slightly-bent black spur.

Apterous female.—Posterior femora slightly incrassate, with a row of black-tipped, testaceous spines as in male. Connexivum broader than in male, the outer margins nearly straight, the apical spine as in male.

Length, 4.42 mm.; width, 1.15 mm.

Holotype, apterous male, and *allotype*, apterous female, Punta Gorda, British Honduras; authors' collection. *Paratypes*, three apterous males, taken with types.

The connexival spines, the mucronate terminal abdominal segment, and the character of the armature of the hind femora will serve to separate this species from allied forms.

***Microvelia diffidentis*, n. sp.**

Moderately large, obovate, brownish black with brown markings; moderately hairy. Head rather long, black, with a prominent median impressed line. Eyes brown, rather large. Antennae brown, lighter at base, rather long and slender, the first segment not greatly enlarged, II slightly more hairy beneath than others, it and III also with a few setae above; formula, 19 : 18 : 28 : 22. Pronotum narrowed anteriorly, much broader than long, indistinctly pitted; a transverse spot in front, the median line and a smaller spot behind brownish. Connexivum quite hairy, the outer margins and segmental sutures blackish. Legs brownish, paler toward base, moderately hairy. Intermediate legs much the longest. Last segment of venter as long as the two preceding ones conjoined.

Length, 2.52 mm.; width, 1.20 mm.

Holotype, apterous female, Sao Matheos, Brazil; in authors' collection.

Paratypes, four apterous females, taken with type.

The hairs of the prosternum and connexivum are black and quite bristly. This species and the following one differ from other known *Microvelia* in the structure of the intermediate legs, reminding one in this respect of *Rhagovelia* except that the tarsi are not constructed as in that genus.

Microvelia turmalis, n. sp.

Form and general color pattern somewhat similar to *diffidentis*, n. sp. Head black, brownish along the eyes, with the usual impressed lines. Antennae brownish black, the first two segments paler, II and III with bristly setae as in *diffidentis*; formula, 15 : 14 : 20 : 18. Rostrum not quite attaining middle of mesosternum. Pronotum broader than long, rather deeply pitted, black, with a transverse brownish spot behind collar, this brownish portion smooth and slightly raised, the basal margin broadly sinuate. Connexivum with the segments largely brown, not so hairy as in *diffidentis*; in female terminating at apex in rather long, brown spines. Legs brownish, darker above, the tarsi blackish. Intermediate legs much the longest. Body beneath grayish black. Last venter about twice as long as the preceding.

Length (σ - φ), 1.9-2.44 mm.; width, 1.3 mm.

Holotype, apterous female, and *allotype*, apterous male, Punta Gorda, Br. Honduras; in authors' collection. *Paratypes*, many males and females taken with types.

This species is closely related to *diffidentis*, n. sp. The connexival spines serve to identify the species at once. In the male the connexivum does not terminate in spines.

Microvelia venustatis, n. sp.

Very small, very broad through humeri, brownish-black, collar testaceous; wings brown, a little lighter at the base; antennae brown, the basal segment in greater part testaceous; legs brown, the trochanters and most of the femora testaceous. Head short and broad, with brownish pubescence. Eyes large, widely separated. Antennae rather short, segment I stout and curved, III slenderest, IV stout and fusiform; formula, 8 : 6 : 7 : 11. Pronotum arched, almost three-fifths broader than long, with a distinct median ridge, triangularly produced and somewhat rounded behind, the humeri rounded. Hemelytra brown, paler toward base, the nervures prominent and darker.

Length, 1.6 mm.; width, .8 mm.

Holotype, winged male, Brazil; in authors' collection.

This pretty little species is most closely allied to *marginata* Uhler and *summersi* D. & H. From the latter it differs in being a little longer and by having much more prominent humeri, and much narrower abdomen. From *marginata* it is to be discriminated by the much less distinct median line on head, the concolorous pronotum, shorter body and proportionally broader pronotum.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

BATS FROM SZECHWAN AND KWEICHOW, CHINA.

BY COLIN CAMPBELL SANBORN.¹

Among the thirteen species of bats collected by the Marshall Field Chinese Expedition of Field Museum of Natural History are five of especial interest from localities which greatly increase their known distribution.

In addition to these, the following also were taken: *Rhinolophus blythi szechwanus* And., *R. rouxi sinicus* And., *R. episcopus* G. M. Allen, *Myotis laniger* Peters, *M. moupinensis* Milne-Edw., *Pipistrellus pulveratus* Peters, *Murina aurata* Milne-Edw., all from Szechwan; and *Hipposideros armiger* Hodgson from Szechwan and Kweichow.

***Lyroderma lyra sinensis* Andersen and Wroughton.**

Eucheira sinensis Andersen and Wroughton, Ann. Mag. Nat. Hist. (7), 19, p. 136, 1907—Amoy, Fukien, China.

A series of thirty-five specimens was taken at Ta Cho Fu (Lat. 29° 20' N., Long. 102° 45' E.), western Szechwan. This series, compared with six specimens of *sinensis* from Fuching, Fukien, kindly loaned by the American Museum of Natural History, are larger throughout. The forearms measure 70-71 mm., against 64-68.4 mm. The Szechwan specimens are much lighter in color, being decidedly brown instead of grayish-brown. The ears and nose-leaves are about the same size as measured on dried specimens.

The total length of the skulls of the Szechwan series is 30.5-31 mm., against 29.3-29.6 mm. Most of the added length appears to be in the rostrum. The posterior edge of the nasal notch is broader and more V-shaped, while in the Fukien skulls the edge is narrowed and rounded.

It appears that the southern *sinensis* bears the same relationship to the Szechwan specimens that *L. l. caurina* And., and Wrought., does to *L. l. lyra* Geoff., and, as the authors of *caurina* said, can only be distinguished by average characters.

Lyroderma sinensis was described from two specimens with forearms of 65.5 and 68 mm., and skull lengths of 29.3 and 32 mm. It is not stated in

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the list of measurements which specimen is the type nor is any mention made of the color. Until skulls of the Szechwan series can be compared with the larger of these skulls of *sinensis* it would not be wise to separate this series on size alone. Also, as it is well known that color varieties exist among many species of bats, a color difference in but two localities would not seem a safe separable character.

***Rhinolophus rex* G. M. Allen.**

Rhinolophus rex G. M. Allen, Am. Mus. Novitates, No. 85, p. 3, 1923—Wanh sien, Szechwan, China.

A female from Tung Wong Tien, Kweichow, almost due south of the type locality, is referred to this species. It equals a topotype of *rex* in all measurements except those given for the horseshoe and sella. These are much lower and narrower, the sella being 6.7 mm. high by 4.2 mm. wide. The topotype was taken in November and this specimen in May so that season might account for the difference in size.

***Trienops wheeleri* Osgood.**

Trienops wheeleri Osgood, Field Mus. Nat. Hist., Zool. Ser. 18, p. 224, 1932—Muong Moun, Tonkin, French Indo-China.

It has seemed advisable to refer three specimens from Tung Wong Tien, Kweichow (40 miles S. W. of Wen-shui), to this species. The specimens are preserved in alcohol and were so badly shot that but one skull is complete enough for study. The skull and wing measurements are both slightly larger than those of the type series but from one specimen, which was dried, the color appears to be the same. More material may show these Chinese specimens to represent a slightly larger subspecies but the present material is not sufficient to characterize them. This is the first record of this genus for China.

***Ia io* Thomas.**

Ia io Thomas, Ann. Mag. Nat. Hist. (7), 10, p. 164, 1902—South Hupeh, China.

A male was collected at Tung Wong Tien, Kweichow, which is about five hundred miles west and a little south of the type locality. The specimen agrees with the description of the type and about equals it in size. Mr. A. de C. Sowerby (China Journal, 17, no. 6, p. 304, 1932) mentions a second specimen from Nanking but gives no information about the record. This Kweichow specimen appears to be the third to be recorded.

***Kerivoula depressa* Miller.**

Kerivoula depressa Miller, Proc. Biol. Soc. Wash., 19, p. 64, 1906—Biapo, northeast of Tounghoo, southern Burma.

A single specimen taken at Yang Cha Shan, five miles east of Kao-ku-ch'ang, southeastern Szechwan, must be referred to this form. It is larger throughout than the measurements given for the type. A specimen from Muong Mo, Tonkin, is externally equal to the type but has a larger skull than either it or the Kweichow specimen. This appears to be the first published record for this species in China.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON LOUISIANA FISHES.

BY HENRY W. FOWLER.¹

The collections reported in this paper were obtained by Mr. Laurence R. Lawler of Lake Charles, chiefly in 1932, or only a few specimens in 1931. These materials are mostly from Lake Charles (1), 32 miles west of Lake Charles (2), 20 miles south-southwest of Lake Charles (3), Prien Lake (4), Calcasieu Lake (5), Calcasieu River at Kinder (6), and 5 miles west (7), 40 miles up stream from Lake Charles (8), Clear Lake at Reeves (9) and the Sabine River at Merryville (10) and 5 miles west (11). They are accompanied by extensive field notes in which a few large species, not represented by specimens, are here included and indicated by an asterisk. Mr. Lawler's specimens number about 200. Mr. Morrow J. Allen sent me a collection of 85 marine fishes obtained at Breton Island (12), in 1932. These notes are given as including a number of marine species not often met with in fresh water, besides others of interest as locality records. A few specimens were also sent to me by Mr. J. Louis Troemner, obtained at New Orleans (13), October 28, 1929. The numbers following the names of the species pertain to those in parentheses following the localities as given above.

Mustelus canis (Mitchill).*

Plentiful in Calcasieu River in early summer far as Prien Lake, 1320 to 1375 mm.

Sphyrna zygaena (Linnaeus).*

Two, about 450 mm., taken in seine at Turner's Bay, July 5, 1932.

Polyodon spathula (Walbaum).*

Not so common as formerly. One 450 mm. passed through irrigation pump in summer of 1928, losing part of its paddle.

¹By permission of the Academy of Natural Sciences of Philadelphia.

Atractosteus spatula (Lacépède).*

One caught in early October, 1932, of 995 mm. length and 220 lbs.

Amiatus calvus (Linnaeus).¹

Four 81 to 94 mm. March 3, 1932.

Megalops atlanticus Valenciennes.*

Several exceeding 610 mm. taken during the past few years. May be seem most any morning feeding on mullet.

Elops saurus Linnaeus.³

One 290 mm. caught on line August 10, 1932.

Dorosoma cepedianum (Le Sueur).¹

One 147 mm. June 18, 1932.

Signalosa mexicana (Günther).¹

Three 57 to 120 mm. with last.

Harengula pensacolae Goode and Bean.⁵

Six 26 to 30 mm. August 10, 1932.

Brevoortia tyrannus (Latrobe).¹

Eight 43 to 55 mm. September 1, 1932. Very abundant in summer.

Anchoviella epsetus (Bonnaterre).¹²

One 119 mm.

Anchoviella mitchilli (Valenciennes).⁴

Ten 52 to 61 mm. June 20, 1932.

Synodus foetens (Linnaeus).¹²

Four 187 to 283 mm.

Erimyzon sucetta (Lacépède).^{1 6 10}

Nine 51 to 154 mm. One a male with pearl organs, though only small scars on preorbital and front fin rays finely tuberculate.

Minytrema melanops (Rafinesque).⁹

One 61 mm. August 20, 1932.

Moxostoma poecilurum (Jordan).^{8 9}

Seven 57 to 184 mm. Young with dark lateral blotches.

Notemigonus crysoleucas (Mitchill).¹

Six 74 to 91 mm. Sold in large quantities as bait for game fishes.

Opsopoeodus osculus Evermann.^{1 9}

Two 48 to 54 mm.

Ceratichthys vigilax (Baird and Girard).^{1 9 10}

Thirteen 53 to 96 mm., of which 6 from 21 miles south of Sulphur, April 13, 1932.

Ericymba buccata Cope.¹⁰

One 46 mm. August 20, 1932.

Hudsonius chamberlaini (Jordan and Evermann).¹⁰

Six 61 to 76 mm. with the last.

Moniana lutrensis (Baird and Girard).¹⁰

Six 50 to 60 mm. Large ones with pearl organs on head above, predorsal and above vent.

Erogala cercostigma (Cope).^{7 10}

Eight 48 to 92 mm. A commercial bait minnow.

Hydrophlox roseus (Jordan).^{10 13}

Two 45 to 48 mm.

Notropis louisianae Jordan and Evermann.⁵

Four 50 to 52 mm. August 10, 1932.

Notropis metallicus Jordan and Meek.¹

One 44 mm.

Phenacobius scopifer (Cope).⁹

One 69 mm. August 20, 1932.

Tachysurus felis (Linnaeus).¹

One 140 mm.

Ictalurus furcatus (Valenciennes).*

One 1373 mm. long of 52 lbs. The chief commercial fresh-water fish.

Ictalurus anguilla Evermann and Kendall.^{4 11}

Three 43 to 330 mm.

Ictalurus punctatus (Rafinesque).^{* 6}

One 458 mm.

Ameiurus nebulosus (Le Sueur).¹

Nine 70 to 148 mm.

Leptops olivaris (Rafinesque).^{* 1}

Common in Calcasieu River and tributaries. Several seen in excess of 75 lbs.

Myrophis punctatus Lütken.⁵

One 208 mm. August 10, 1932. Taken after a severe Gulf storm, like other specimens with this date.

Esox niger Le Sueur.

Two 70 to 105 mm. 10 miles south of Holmwood, September 16, 1931.

Zygonectes notatus (Rafinesque).⁶

Four 52 to 64 mm. August 20, 1932. Found in most streams and very agile.

Zygonectes chrysotus (Holbrook).^{1 13}

Ten 48 to 68 mm. Abundant in flooded rice fields. Uniform or with 9 to 12 dark vertical bars.

Zygonectes dispar Agassiz.¹

Eight 35 to 58 mm.

Cyprinodon variegatus Lacépède.^{1 3}

Seven 34 to 38 mm. With black dorsal blotch. Dark vertical bars along sides of trunk and tail, extending high on back.

Gambusia patruelis (Baird and Girard).^{1 13}

Ten 28 to 45 mm. Abundant in swamps, sluggish streams and ditches.

Mollienesia latipinna Le Sueur.

Six 43 to 48 mm. from Holl Beach near the Gulf, December 20, 1931.

Strongylura marina (Walbaum).⁴

Two 287 to 340 mm. June 22, 1932. Very small ones 65 mm.

Urophycis floridanus (Bean and Dresel).¹²

Three 169 to 192 mm.

Ancylosetta quadrocellata Gill.¹²

Four 137 to 215 mm.

Citharichthys spilopterus Günther.⁵

Five 87 to 103 mm. August 10, 1932.

Etropus microstomus (Gill).¹²

Six 87 to 140 mm.

Achirus lineatus (Linnaeus).¹²

Four 67 to 100 mm.

Achirus fasciatus Lacépède.^{4 12}

Eight 39 to 130 mm. Also taken in cold fresh-water streams.

Symphurus plagiusa (Linnaeus).¹²

One 139 mm.

Syngnathus scovelli Evermann and Kendall.¹

One 80 mm. in February, 1932. Rings 17. Snout over ½ in head.

Syngnathus affinis Günther.⁴

Five 81 to 103 mm. July 5, 1932. Numerous in brackish water, occasional in fresh water.

Menidia peninsulae (Goode and Bean).^{4 5}

Seven 41 to 65 mm.

Membras vagrans (Goode and Bean).⁵

Five 56 to 61 mm. August 10, 1932.

Labidesthes sicculus (Cope).¹ ⁵

Nine 54 to 81 mm.

Mugil brasiliensis Agassiz.⁴ ⁵

Ten 52 to 123 mm.

Polydactylus octonemus (Girard). ⁵ ¹²

Five 128 to 168 mm.

Scomberomorus maculatus (Mitchill).*

Several 408 to 510 mm. August 12, 1932, where Calcasieu River enters the Gulf.

Oligophites saurus (Schneider).⁵

Four 30 to 40 mm. August 10, 1932.

Caranx hippos (Linnaeus).⁴ ⁵

Eight 41 to 100 mm. Makes shrill croaking sound when taken from the water.

Seserinus paru (Linnaeus).¹²

Two 193 to 208 mm.

Poronotus triacanthus (Peck).¹²

Three 100 to 170 mm.

Aphredoderus sayanus (Gilliams).¹

Ten 28 to 63 mm., of which nine from 10 miles south of Holmwood September 16, 1931.

Elassoma zonatum Jordan.¹

Seven 29 to 33 mm.

Pomoxis sparoides (Lacépède).¹

Six 71 to 103 mm. June 1, 1932. Called "white perch."

Chaenobryttus gulosus (Cuvier).¹

Ten 53 to 107 mm. April 6, 1932.

Lepomis auritus (Linnaeus).¹

Three 75 to 105 mm.

Lepomis miniatus (Jordan).¹ ⁹

Eleven 51 to 127 mm. Usually young with developed palatine teeth.

Lepomis megalotis (Rafinesque).¹

One 119 mm. April 6, 1932.

Lepomis incisor (Valenciennes).¹

Four 43 to 60 mm.

Micropterus pseudaplites Hubbs.¹

Four 50 to 98 mm. Called "green trout" or "green bass," fairly plentiful.

Hadropterus serrula (Jordan and Gilbert).⁹

One 50 mm. August 20, 1932.

Ulocentra stigmatia (Jordan).¹³

One 45 mm.

Boleosoma camurum Forbes.⁹

Two 36 to 43 mm. August 20, 1932. Snout blunt and short and dark bar below eye.

Ammocrypta pellucida (Agassiz).^{6 13}

Seven 41 to 56 mm. Body entirely scaly.

Boleichthys fusiformis (Girard).¹

One 36 mm.

Morone interrupta Gill.⁴

Two 123 to 125 mm. July 3, 1932.

Centropristis philadelphicus (Linnaeus).¹²

Six 123 to 145 mm.

Lutjanus campechanus (Poey).*

Several off Cameron July 5, 1932. Deep brick red, fins lighter and caudal tipped black and eyes red.

Lutjanus synagris (Linnaeus).¹²

One 148 mm.

Orthopristis chrysopterus (Linnaeus).¹²

Two 152 to 178 mm.

Otrynter caprinus (T. H. Bean).¹²

One 74 mm. Abnormal predorsal unevenly concave in profile.

Lagodon rhomboides (Linnaeus).¹²

Two 87 to 130 mm.

Cynoscion arenarius Ginsberg.⁵

Seven 70 to 123 mm. This identification not altogether satisfactory as this species is said to differ from *C. nothus* (Holbrook) in the internal character of 25 vertebrae, compared with 27 (rarely 26) for Holbrook's species.

Eriscion nebulosus (Cuvier).⁵

One 68 mm. August 10, 1932. Called "speckled trout."

Larimus fasciatus Holbrook.¹²

Four 61 to 81 mm.

Stellifer lanceolatus (Holbrook).¹²

Five 124 to 142 mm.

Sciaenops ocellatus (Linnaeus).*

Large numbers 384 to 610 mm. long at lower Calcasieu Lake in 1932.

Micropogon undulatus (Linnaeus).⁴

Six 93 to 98 mm. June 22, 1932. Abundant in summer.

Menticirrhus americanus (Linnaeus).¹²

Three 203 to 215 mm.

Pogonias cromis (Linnaeus).*

One nearly 20 lbs. at Prien Lake October 15, 1932.

Aplodinotus grunniens Rafinesque.*

One nearly 3½ lbs. September 1, 1932. Common in fresh water.

Chaetodipterus faber (Broussonet).¹²

Three 108 to 137 mm.

Prionotus tribulus (Cuvier).¹²

Three 134 to 208 mm.

Prionotus scitulus Jordan.¹²

One 173 mm.

Leptecheneis naucrates (Linnaeus).¹²

Two 255 to 370 mm.

Microgobius gulosus (Girard).⁵

One 54 mm. June 18, 1931.

Rissola marginata (De Kay).¹²

Four 193 to 218 mm.

Nautopaedium porosissimum (Valenciennes).¹²

Four 148 to 162 mm.

Opsanus tau (Linnaeus).¹²

Two 110 to 168 mm.

Monacanthus hispidus (Linnaeus).¹²

Five 72 to 273 mm.

Sphoeroides testudineus (Linnaeus).⁵

One 67 mm. August 10, 1932.

PROCEEDINGS
OF THE
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NOTES ON *NILTAVA SMITHI*.

BY J. H. RILEY.¹

In 1929, I described in these Proceedings, page 162, *Niltava smithi*, founded upon a single female from the summit of Doi Sutep, Siam. Later the same year de Schauensee² described *Niltava williaminae* from the same locality, also founded upon a single female. Recently Dr. Hugh M. Smith has sent the U. S. National Museum two adult males and two adult females of *Niltava smithi*, from Siam, taken at Khun Tan at 4,000 feet. With the acquisition of the males it became at once apparent that the form was closely related to *Niltava davidi* and possibly was the same as *Niltava davidi lychnis* of western China. I am indebted to the Museum of Comparative Zoology for the loan of three males and one female of the latter and to the Academy of Natural Sciences, Philadelphia, for forwarding the type of *Niltava williaminae*, for study in this connection.

The males of *Niltava smithi* are similar to those of *N. davidi lychnis*, but the black frontal band is narrower, the pileum duller blue, the back duller, duskier blue, the shining blue spot on the sides of the neck is duller, less bright and the size larger.

The females of *N. smithi* and *N. davidi lychnis* are quite distinct. The female of the latter has the frons and pileum concolor or only a little lighter dresden brown than the back, while in *N. smithi*, the frons is narrowly clay color; the feathers of the pileum and nape deep olive-gray at the tip, a little deeper sub-terminally, presenting a somewhat scaled appearance; in *N. d. lychnis* the mentum is white, followed by a small buffy spot, the cheeks, ear-coverts and sides of throat like the chest, buffy brown, the jugular spot white, while in *N. smithi* the lores, chin, throat, ear-coverts, and ocular area are clay color edged or tipped with deep olive-gray, making these areas more or less flammulated, the chest dark olive-buff, the jugular patch deep colonial buff. In *N. d. lychnis* the belly and under tail-coverts

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²Proceedings Acad. Nat. Sci. Phila., vol. 81, p. 469.

are white, while in *N. smithi*, the belly is pale smoke gray, only the center whitish, and the under tail-coverts are deep olive-buff with light grayish olive centers. The mantle in *N. smithi* is buffy brown with a grayish cast and the upper tail-coverts buckthorn brown; in *N. d. lychnis* the back is dresden brown and the upper tail coverts cinnamon brown. The tail in *N. smithi* is prouts brown on the middle feathers and on the outer web of the remainder, dusky on the inner web of the outer feathers and the tips of all the feathers, the shafts blackish, while in *N. d. lychnis*, the tail is cinnamon brown and the shafts of the feathers are the same. The wings in *N. smithi* are blackish, the feathers only narrowly edged with the color of the back. In *N. d. lychnis*, they are dusky, the feathers broadly edged with cinnamon. The female of *N. smithi* and the only female examined of *N. davidi lychnis*, both lack the light soft blue-violet neck patch of the female of *N. sondara*, though La Touche³ describes the female *Niltava davidi davidi* as having it.

The type of *Niltava williaminae*, marked as a female, when compared with the three females of *N. smithi* collected by Dr. Hugh M. Smith, has the pileum more washed with brownish; the back a deeper, more reddish buffy brown without the grayish cast; the upper tail-coverts a deeper, more reddish brown; below the breast and belly are more washed with clay-color and the under tail-coverts deeper buff. While the type does not exactly match any of the three females of *N. smithi*, I am nevertheless of the opinion that it is only an individual variation of this species, as none of the differences are great. It may be that the type of *williaminae* is really a young male. A young male of *Niltava sondara denotata* in the U. S. National Museum shows this same degree of difference when compared with the female of the same form.

It remains to say a word concerning the males of *N. smithi* and *N. sondara denotata*. In the former the pileum, neck patch, shoulder patch, and rump are a much darker, less shining blue; the back duskier; below the differences are not as great, but *denotata* is lighter, near raw sienna, while *smithi* has more of a tawny cast. It seems strange that the males of *N. smithi*, *N. davidi*, and *N. sondara* should be so similar and the females so different, but it is a case similar to that of many species of *Cyornis*. The specimens measure as follows:

- 2 ♂♂ of *Niltava smithi*: wing 93.5–100; tail 78–82; culmen 12–13 mm.
 - 3 ♂♂ of *N. davidi lychnis*: wing 88.5–94 (91.2); tail 66–74 (69.8); culmen. 11.5–12 (11.7) mm.
 - 3 ♀♀ of *N. smithi*: wing 92–100 (95.7); tail 68–81 (74); culmen 12–12.5 (12.2) mm.
 - 1 ♀ of *N. d. lychnis*: wing 92; tail 62.5; culmen 11 mm.
- The type of *N. williaminae*: wing 100; tail 80; culmen 12 mm.

³Handbook Birds E. China, pt. 2, 1925, p. 171.

PROCEEDINGS
OF THE
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A NEW LIZARD FROM NICARAGUA.

BY EMMETT REID DUNN.¹

A small collection of snakes and lizards from Nicaragua was recently sent me for determination by the United States National Museum, to whose authorities I am indebted for the privilege of examining and describing a remarkable new species of *Eumeces* contained therein.

Eumeces managuae, sp. nov.

Type.—U. S. N. M. no. 89474, male adult, collected by James H. Ivy.

Type locality.—Managua, Nicaragua, Aviation Field.

Diagnosis.—A *Eumeces* allied to *schwartzii* of Mexico and *scutatus* and *taeniolatus* of northwest India; 17 pairs of enlarged nuchals, followed by 52 enlarged middorsals to base of tail; scales around body 23-21-19-17 (17 from midbody to groin); appressed limbs widely separated; one postmental; nostril above suture between rostral and first labial; black spots on each scale above, forming lines on the body.

Description.—Rostral broader than high; nasal almost entirely occupied by the enlarged nostril, which is above the rostro-labial suture; postnasal present; internasals meeting in a suture; anterior loreal higher than long; upper labials 8 on left side, 9 on right; fifth upper labial is subocular on left side, sixth on right; penultimate labial largest, ultimate small and low; fronto-nasal in contact with frontal; frontal in contact with interparietal; parietals separated by interparietal, bordered by a temporal and a nuchal; supraoculars 4 left, 5 right, anterior in contact with prefrontal and frontal, second largest, 3 on left side and 4 on right in contact with frontal and frontoparietal; postmental in contact with two lower labials; one pair of genae in contact; two enlarged preanals; 17 pairs of nuchals; 52 enlarged middorsals, extending from nuchals to base of tail, as wide as a pair of nuchals; scale rows 23 at axilla, 17 at midbody and from there to base of tail; a row of enlarged scales on venter of tail; appressed limbs widely separated; tail incomplete, scarcely tapering in first 53 mm. of length; total length 170 mm.; head to hind edge of ear 19; head and body 117; axilla to groin 61; arm 20; leg 29; tail 53; light brown above with a black

¹Contributions from the Department of Biology, Haverford College, No. 17.

spot on each scale (two on rostral, frontal and enlarged middorsals); these forming lines on body and tail; tail similarly spotted below; spots on lower labials; rest of venter white.

Remarks.—Only three other described species of *Eumeces* need comparison. They may be separated as follows:

- A. American species, with 14–17 pairs of nuchals; 1 postmental; nostril above rostro-labial suture.
 - B. Nuchals 14; middorsals 34; legs meeting; anteriorly with three broad stripes; posteriorly with spots in lines; Mexico.....*schwartzzi*
 - BB. Nuchals 17; middorsals 52; legs widely separated, no broad stripes but spots in lines; Nicaragua.....*managuae*
- AA. Indian species, with 4–5 pairs of nuchals; legs widely separated.
 - B. Two postmentals; nostril above first labial; 3 broad stripes.....*scutatus*
 - BB. One postmental; nostril above rostro-labial suture; spots in lines.....*taeniolatus*

These are the only *Eumeces* with enlarged middorsals, and it is obvious that they form a natural and a closely related subgroup of the genus. Indeed, in some ways each of the American species is more like one of the Indian species than it is like its American relative. The distribution, the Punjab, the east coast of southern Mexico, and the west coast of Nicaragua, is quite weird; but the American species have certainly no direct relationship with any other American *Eumeces*. Save for the recently described *schmidtii* from Honduras, which is close enough to *fasciatus*, *schwartzzi* and *managuae* are the only New World *Eumeces* south of the Mexican Plateau. I am somewhat inclined to use *Eurylepis* Blyth (1854, Journ. Asiatic. Soc. Bengal 23, p. 739, type *taeniolatus*) as a name for these four “*Eumeces*” with enlarged middorsals,

PROCEEDINGS
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A NEW RACE OF DEER FROM
EASTERN CALIFORNIA.

BY IAN McTAGGART COWAN,
Museum of Vertebrate Zoology, University of California.

A study, now in progress, of the deer of the Pacific coast area has revealed the presence of a hitherto unnamed race of mule deer in eastern California. The proposed name, together with the characteristics of the new race, follows.

Odocoileus hemionus inyoensis, new subspecies.

INYO MULE DEER

Type.—Male, adult; skin, skull and skeleton; no. 16363, Mus. Vert. Zool.; "Kid Mountain" at altitude of 11,000 feet, 10 miles west Big Pine, Inyo County, California; October 15, 1911; collected by H. A. Carr, orig. no. 656.

Range.—Eastern slope of southern Sierra Nevada, in Owens Valley district of California.

Diagnosis.—A medium-sized race of mule deer (measurements of type: total length, 1740 mm., tail, 180 mm., hind foot, 485 mm.). Color (in full winter pelage): Above, in general tone, Cream Buff to Chamois (only capitalized color terms are from Ridgway, Color Standards and Color Nomenclature, 1912); tips of hairs black, producing pepper-and-salt effect usual in any mule deer; dark vertebral stripe originates anteriorly in the dark brow patch and proceeds posteriorly as a narrow median stripe, increasing in width and merging with color of rest of upper parts on rump; brown of back extended mid-dorsally to root of tail, thus interrupting dorsal margin of white rump patch; brow patch yellowish brown with sharply defined black V-shaped mark extending, from point on midline about 2 inches anterior to eyes, midway along eyebrows; face yellowish gray; muzzle whitish except for usual black ring posterior to rhinarium; ears, outside dark gray, inside white; white patch at base of ear restricted; ears not shaggy; black tip of tail as long as white portion; white of inguinal region extending forward in two wedge-shaped areas to within 6 inches of axillae and separated by a narrow posterior projection of gray color of brisket extending back to anterior border of inguinal region; brisket brownish gray; metatarsal gland 4 inches long. Skull short, relatively wide across zygomata and narrow across mastoids, giving appearance of

high occiput; that part of squamosal arm of zygoma which forms mandibular fossa elevated at outer margin so that posterior part forms angle of 90 degrees with anterior part; lower lachrymal duct larger than upper and piercing rim of orbit anterior to center of rim; nasals relatively broad posteriorly.

Comparisons.—From *Odocoileus hemionus californicus* (Caton), *O. h. inyoensis* differs in slightly greater average size and predominantly yellowish rather than dusky dorsal surface; crown patch yellowish rather than black with gray flecking; dark vertebral stripe neither so broad nor so well defined. Dark stripe from apex of dark V on forehead, to base of rhinarium, absent; white of inguinal region more extensive; brisket lighter, brownish rather than blackish; skull larger in every part measured save mastoid width which is relatively as well as actually less (mastoid width 97% rather than 104% of orbital width).

From *Odocoileus hemionus hemionus* (Rafinesque), *O. h. inyoensis* differs as follows: Average size less; general coloration yellower; brow patch yellow rather than gray; ears shorter and much less shaggy, darker behind and with white spot at base more restricted; brisket brown rather than black; inguinal white patch more extensive, projecting up onto breast in two wedge-shaped areas; metatarsal gland shorter, averaging 4 inches in *inyoensis* as against 5 inches in *hemionus*. Selected cranial characters in which *inyoensis* differs from *hemionus* are as follows: Zygomatic width 59% of basilar length, measured from anterior lip of foramen magnum to posterior margin of incisive foramen, as against 55% in the latter form; palatal width 45% rather than 43% of palatal length; mastoid width 68% rather than 72% of zygomatic width.

Remarks.—On point of external appearance, *inyoensis* shows close approach to representatives of *hemionus* from northeastern California, but an analysis of the cranial characters indicates the nearest affinity of this race to be with *californicus*. From both of these races, however, *inyoensis* can readily be distinguished by the large amount of white on the underparts and breast, and by the relatively narrower mastoid region.

A few specimens of *hemionus* from Siskiyou County, California, show a tendency to have the white of the abdominal region extended forward onto the breast, but not to such a marked degree as is exhibited by *inyoensis*. Comparable specimens from Nevada, Colorado, and Placer County, California, show no such tendency.

Two juvenile specimens from the type locality, nos. 16361 and 16362, Mus. Vert. Zool., agree with the type in all essentials of coloration, with the exception that the ears are darker outside and in one there is a dark spot at the base of the tail.

In making cranial comparisons the average measurements of 6 adult male *hemionus* from Modoc County, California, and 26 adult male *californicus* from Santa Barbara County, California, were used.

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FIVE NEW RODENTS FROM ARIZONA AND NEW
MEXICO.

BY E. A. GOLDMAN.

In revising the squirrels of Mexico and Central America, Nelson (Proc. Washington Acad. Sci., vol. 1, p. 94, May 9, 1899) included the Chiricahua Mountains, Arizona, in the range of *Sciurus apache*, apparently on the basis of a single specimen then available. Study of the series accumulated in recent years, however, reveals distinguishing characters for this isolated northern colony. My thanks are due to Mr. H. E. Anthony, Curator of Mammals, American Museum of Natural History, for his kindness in loaning the type of *S. apache* for comparison.

The type of *Thomomys chrysonotus* Grinnell, from Ehrenberg, Arizona, remained unique until 1931 when a fine series of specimens from at or very near the type locality was taken by George Willett for the Los Angeles Museum. Eight of these specimens, delineating the general range of individual variation, renders it possible to determine more definitely the relationship of *chrysonotus* to neighboring forms. As a result specimens from the desert plains of southwestern Arizona, hitherto assigned to *chrysonotus*, are found to be quite different, and a single example from the Harquahala Mountains presents characters that appear to be quite distinctive. Four new subspecies of *Thomomys* are here described. For the privilege of studying the topotypes of *chrysonotus* I am much indebted to Mr. Willett.

Sciurus chiricahuae, sp. nov.

CHIRICAHUA MOUNTAIN SQUIRREL.

Type.—From Cave Creek, Chiricahua Mountains, Cochise County, Arizona (altitude 5,200 feet). No. 244124, ♀ adult, skin and skull, U. S.

National Museum (Biological Survey collection), collected by E. A. Goldman, August 16, 1923. Original number 23527.

Distribution.—Known only from the Chiricahua Mountains, Arizona.

General characters.—A vividly colored species, with tawny thighs and forearms contrasting strongly with grizzled back. Closely allied to *Sciurus apache* of the Sierra Madre of Mexico, but color richer, more intense, the fore-limbs, under parts, orbital rings and post-auricular patches near tawny instead of ochraceous buff; cranium more evenly arched in upper outline, the frontal region less flattened anteriorly as viewed from the side.

Color.—*Type* (summer pelage): General dorsal area from top of head to rump a nearly uniform mixture of light ochraceous buff and black producing a grizzled effect, extending well down to a sharp line of demarcation on lower part of sides; limbs and under parts near pure light tawny, contrasting strongly with grizzled general body color; orbital rings, post-auricular patches, tip of nose and lips light tawny like under parts; tail above ochraceous buff mixed with black, the individual hairs tricolored, ochraceous buff at base, black on median third, becoming abruptly lighter ochraceous buff toward tips; tail below light tawny along broad median line, interrupted by a black zone giving way to broad, light ochraceous buffy marginal areas. In some specimens the outer sides of the thighs are deeper tawny than in the type.

Skull.—Very similar to that of *S. apache*, but shorter and relatively slightly broader; frontal profile more convex across anterior roots of zygomatics, giving the cranium a more evenly arched upper outline as viewed from the side; nasals shorter, broader anteriorly, the anterior nares opening more widely; dentition about the same.

Measurements.—*Type*: Total length, 552 mm.; tail vertebrae, 275; hind foot (c. u.), 75. Average of ten adults (including type) from Chiricahua Mountains (5,200–9,000 feet); 544 (530–552); 264 (250–275); 75.5 (73–80).

Skull (type).—Greatest length, 63.7; condylobasal length, 58; zygomatic breadth, 38.2; interorbital constriction, 21.5; length of nasals, 21.5; greatest width of nasals anteriorly, 9.8; maxillary toothrow (alveoli), 11.7.

Remarks.—*Sciurus chiricahuae* and *S. apache* are obviously very closely allied, but the differences pointed out appear to be trenchant, and in view of their geographic separation by intervening desert plains the two may be treated as specifically distinct. Specimens from the San Luis Mountains, a northern spur of the Sierra Madre extending across the Mexican Boundary in southwestern New Mexico, are referable to *apache*. Comparison has been made with 38 specimens of *apache* from various localities within its range, which extends southward at least to El Salto, southern Durango.

Specimens examined.—Eleven, all from the Chiricahua Mountains, Arizona.

***Thomomys fulvus phasma*, subsp. nov.**

TULE DESERT POCKET GOPHER.

Type.—From two miles south of Tule Tank, Tule Desert, near Mexican Boundary, Yuma County, Arizona. No. 203026, ♀ adult, skin and skull,

U. S. National Museum (Biological Survey collection), collected by E. A. Goldman, December 8, 1913. Original number 22355.

Distribution.—Lower part of Gila River Valley and desert region of southwestern Arizona, from the Colorado River east at least to Quitobaquito, ranging south into northwestern Sonora.

General characters.—One of the palest of the known forms of the genus. Closely allied to and in color about like *Thomomys perpallidus albatrus* of the western side of the Colorado River in California, but smaller and cranial characters distinctive. Similar to *Thomomys fulvus chrysonotus* of the eastern side of the Colorado River Valley near Ehrenberg, Arizona, but paler, less yellowish, and audital bullae decidedly smaller. Differing from *Thomomys fulvus cervinus* and *Thomomys fulvus modicus*, its geographic neighbors on the east, by pallid coloration and combination of skull characters.

Color.—*Type* (acquiring summer pelage): Upper parts between pale pinkish buff and pinkish buff (Ridgway, 1912), scarcely modified by dark-tipped hairs, except for a fine admixture on face, top of head, and median dorsal area, passing gradually into white along lower part of sides; under parts overlaid with white, the light plumbeous basal color showing through except on chin and inner sides of forearms; muzzle dusky; ears blackish; black post-auricular spots small; limbs and tail white. In some specimens the black post-auricular spots are scarcely discernible and the under parts are nearly pure white to roots of hairs. One example from Tule Wells, near the type locality is darker, or more pinkish buff than usual, while another from the same place and in the same winter pelage exhibits the pallor normal in the subspecies.

Skull.—Closely resembling that of *T. p. albatrus*, but smaller, less angular, more smoothly rounded; braincase usually narrower; upper outline more evenly curved as viewed from the side (tending to bulge upward more prominently across anterior roots of zygomatics in the older adults of both sexes in *albatrus*); nasals shorter; incisors narrower. Smaller than that of *T. f. chrysonotus*, with shorter nasals; bullae smaller, less bulging below level of basioccipital; incisors much narrower. Still more decidedly smaller than that of *T. f. cervinus*, and differing otherwise in about the same characters as from *chrysonotus*, except the audital bullae which are relatively about the same. Compared with that of *T. f. modicus* the skull is relatively shorter, broader, and more flattened; nasals shorter; audital bullae similar; incisors slightly narrower.

Measurements.—*Type*: Total length, 199; tail vertebrae, 66; hind foot (c. u.), 29. An adult female topotype: 195; 68; 29.5. *Skull* (type): Condylbasal length, 34.1; zygomatic breadth, 22; greatest breadth across squamosals (over mastoids), 18.9; interorbital constriction, 6.3; length of nasals, 11; maxillary toothrow (alveoli), 7.7; width of upper incisors (cutting edge), 3.8.

Remarks.—In describing new pocket gophers from Arizona (Journ. Washington Acad. Sci., vol. 21, no. 17, pp. 416–417, Oct. 19, 1931), I pointed out the close affinity of the pocket gophers inhabiting the eastern and western sides of the lower course of the Colorado River. This was

regarded as due to the shifting channels and the probable transfer of colonies from one side to the other from time to time. While animals from near the delta on the opposing sides are nearly identical in color and differ only slightly in combination of cranial characters progressive divergence is shown in series from more distant points. Specimens from Quitobaquito are darker and apparently grade toward *modicus* in color, but the skulls are about like those of typical *phasma*.

Specimens examined.—Total number, 38, as follows:

Arizona: Colorado River (at Mexican Boundary Monument 204), 1; Gadsden, 7; Somerton, 1; Quitobaquito, 2; Tacna, 1; Tule Tank (type locality), 3; Tule Well (near type locality), 2; Yuma, 11; Yuma (18 miles south), 7.

Sonora: Cienega Well (30 miles south of Monument 204), 2; Colorado River (20 miles south of Mexican Boundary), 1 (skull only).

***Thomomys fulvus subsimilis*, subsp. nov.**

HARQUAHALA MOUNTAIN POCKET GOPHER.

Type.—From Harquahala Mountains, Yuma County, Arizona (altitude 3,000 feet). No. 227803, ♀ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by E. A. Goldman, October 14, 1917. Original number 23356.

Distribution.—Known only from the Harquahala Mountains, but may inhabit other desert ranges of western Arizona.

General characters.—A very small, rather pale form with a weakly-developed skull. Most closely allied to *Thomomys fulvus desertorum* of the Detrital Valley region of northwestern Arizona, but smaller and paler, more cinnamon buffy (near tawny or ochraceous tawny) in *desertorum*, with a more slender skull. Much smaller and paler than *T. f. fulvus* of San Francisco Mountain. Darker and contrasting strongly in delicate structure with its geographic neighbors, *T. f. chrysonotus* and *T. f. flavidus*, of the Colorado River Valley.

Color.—*Type* (acquiring fresh pelage): Upper parts near cinnamon brown, purest on cheeks, shoulders, and sides, finely and rather inconspicuously mixed with black along median dorsal area; small patches of worn pelage on posterior part of back near cinnamon in tone; face and top of head darker, the dusky hairs more numerous; under parts, forearms, and thighs pinkish buff; muzzle dusky; ears and small post-auricular areas deep black; feet and tail whitish.

Skull.—Small, slender and delicate in structure, with a narrow but high and rounded braincase. Rather closely resembling those of *T. f. fulvus*, and *T. f. desertorum* but smaller, with a narrower, relatively more highly arched, more smoothly rounded braincase; zygomata more slender, almost thread-like; audital bullae rather small, but fully inflated as in *desertorum*; dentition light. The skull is similar to those of *T. f. chrysonotus* and *T. f. flavidus* in general form, but differs so widely in diminutive size that close comparison is not required.

Measurements.—*Type*: Total length, 183; tail vertebrae, 60; hind foot

(c. u.), 25. *Skull* (type): Condylobasal length, 30.8; zygomatic breadth, 19.2; greatest breadth across squamosals (over mastoids), 16; interorbital constriction, 6.5; length of nasals, 10.2; maxillary toothrow (alveoli), 6.8; width of upper incisors (cutting edge), 3.2

Remarks.—With some hesitation a new subspecies is proposed on the basis of a single female specimen. The characters presented, however, appear to be well beyond the range of individual variation in the neighboring forms, and adult males may be expected to reveal more distinctive features. The new form may prove to have an extensive range in the desert mountains of the general region.

***Thomomys fulvus mutabilis*, subsp. nov.**

VERDE VALLEY POCKET GOPHER.

Type.—From Camp Verde, Yavapai County, Arizona (altitude 3,200 feet). No. 214611, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Walter P. Taylor, July 25, 1916. Original number 269.

Distribution.—Valleys and lower slopes of mountains in the Gila River drainage along the southern side of the Mogollon Plateau, Arizona, ranging mainly in Lower Sonoran Zone.

General characters.—A medium-sized, cinnamon buffy subspecies. Closely allied to *Thomomys fulvus fulvus* of San Francisco Mountain, Arizona, but color distinctly more cinnamon buffy, instead of cinnamon (Ridgway, 1912), the upper parts less mixed with black, and skull more massive. Probably intergrading with *T. f. cervinus* of the Salt River Valley near Phoenix, but smaller and color rich cinnamon buff, instead of dull pinkish buff. Similar in color to *T. f. desertorum* of Detrital Valley, north-western Arizona, but usually darker, and skull larger, more massive. Differing from *T. f. toltecus* of northwestern Chihuahua mainly in smaller, less massive skull; color usually somewhat brighter, more cinnamon buffy.

Color.—*Type* (acquiring fresh pelage): Upper parts near cinnamon buff with a light tawny admixture, purest along sides, the top of head and median dorsal area somewhat obscured by dark-tipped hairs; muzzle blackish; ears and small but sharply defined post-auricular areas deep black; under parts, forearms, and thighs cinnamon buff; feet whitish; tail light brownish above on basal two-thirds, lighter below, becoming whitish all around toward tip. Topotypes varying in tone from cinnamon buff to near tawny.

Skull.—Very similar to that of *T. f. fulvus* but heavier; basicranial region usually decidedly broader; audital bullae larger. Resembling that of *T. f. desertorum*, but larger and more massive. Similar to those of *T. f. cervinus* and *T. f. toltecus*, but smaller than either, with relatively smaller audital bullae.

Measurements.—*Type*: Total length, 236; tail vertebrae, 71; hind foot, 31. Average of seven adult female topotypes: 216 (203–228); 68 (64–73); 29 (27.5–30.5). *Skull* (type): Condylobasal length, 41.2; zygomatic breadth, 26.4; greatest breadth across squamosals (over mastoids), 20.3;

interorbital constriction, 6.5; length of nasals, 14.4; maxillary toothrow (alveoli), 8.8.

Remarks.—*Thomomys f. mutabilis* ranges in the valleys and along the lower southern slopes of the Mogollon Plateau from the Verde River east to near the New Mexican Boundary. Specimens vary slightly from locality to locality, as usual in the group. The region of the type locality is intermediate in geographic position and specimens from it tend to bridge the gap between *T. f. fulvus* and *T. f. cervinus*, but differ too widely to be properly referred to either. Specimens from Safford in the upper part of the Gila River Valley are somewhat larger and apparently grade toward *T. f. toltecus*.

Specimens examined.—Total number, 44, all from Arizona as follows: Camp Verde (type locality), 21; Cazador Spring (south base of Nantan Plateau), 1; H-bar Ranch (10 miles south of Payson), 2; Montezuma Well (near Camp Verde), 3; Rice, 6; Safford, 9; Turkey Creek, Yavapai County, 2.

***Thomomys fulvus emotus*, subsp. nov.**

ANIMAS MOUNTAIN POCKET GOPHER.

Type.—From Animas Peak, Animas Mountains, Hidalgo County, southwestern New Mexico (altitude 8,000 feet). No. 157005, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by E. A. Goldman, August 3, 1908. Original number 19929.

Distribution.—Known only from the upper slopes (7,000–8,000 feet) of the Animas Mountains, New Mexico.

General characters.—A small, dark brown subspecies, with a short, broad skull; upper incisors curving directly downward (not projecting forward beyond anterior plane of nasals). Similar to *Thomomys fulvus collinus* of the Chiricahua Mountains but smaller and color darker cinnamon; skull smaller and differing in detail. Closely resembling *Thomomys fulvus intermedius* of the Huachuca Mountains, and *Thomomys burti* of the Santa Rita Mountains but color brighter, more uniform cinnamon brownish, without a well-defined black median dorsal area, and skull shorter than in either. Differing from *Thomomys mearnsi* of the Animas Valley and lower slopes of the Animas Mountains, in decidedly darker color and cranial details, especially the more strongly decurved upper incisors.

Color.—*Type* (worn summer pelage): Upper parts near cinnamon brown (Ridgway, 1912), somewhat lighter, and nearer cinnamon along lower part of sides; middle of back dusky, owing apparently to wearing away of cinnamon brown tips of hairs; muzzle, face, and top of head blackish; under parts overlaid with cinnamon, the under color of pelage dark plumbeous nearly everywhere; a small, irregular, pure white spot (without special significance) on middle of breast, and one on each wrist; ears and auricular spots deep black; forearms and thighs cinnamon; feet and tail dull whitish. A topotype is nearly identical in color.

Skull.—Cranium small, short, and light in structure, with strongly decurved upper incisors. Similar to that of *T. c. collinus*, but decidedly smaller, less angular; braincase more smoothly rounded; temporal ridges

more widely separated and lambdoid crest less prominent in mature males; interorbital region less constricted; dentition rather light; upper incisors more decurved than in the type of *collinus*. Differing from that of *T. mearnsi* in about the same characters as from *collinus*, except that the upper incisors contrast still more markedly in directly downward curvature (upper incisors inclined strongly forward and projecting beyond anterior plane of nasals in *mearnsi*). Approaching in size and closely resembling that of the geographically isolated form, *T. burti*, but somewhat shorter and slightly flatter, the upper outline apparently straighter; rostrum slightly shallower; nasals narrow and deeply emarginate posteriorly as in *burti*, and dentition about the same.

Measurements.—*Type*: Total length, 202; tail vertebrae, 60; hind foot, 26. An adult male topotype: 197; 55; 27. *Skull* (type): Condylbasal length, 34.6; zygomatic breadth anteriorly (zygoma broken posteriorly), 21.2; greatest breadth across squamosals (over mastoids), 17.5; interorbital constriction, 7.2; length of nasals, 12.5; maxillary toothrow (alveoli), 7.2; width of upper incisors (cutting edge), 4.

Remarks.—Specimens of the present form were assigned by Bailey (North Amer. Fauna, no. 39, p. 85, Nov. 15, 1915) to *T. f. intermedius*. The collection of additional material in southern Arizona has, however, indicated that *intermedius* must be accorded a more restricted range, and that several closely allied forms inhabiting the upper slopes of high mountains in the general region present distinctive characters and warrant separate recognition. Intergradation with *T. mearnsi*, which occurs from 5,000 feet on the open plains of Animas Valley up to 5,800 feet on the lower slopes of the Animas Range, is not definitely shown but is strongly suggested by general comparisons.

Specimens examined.—Three (including type), all from near the top of the Animas Mountains, New Mexico.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

FIVE NEW SHREWS OF THE GENUS *CRYPTOTIS*
FROM MEXICO AND GUATEMALA.

BY HARTLEY H. T. JACKSON.

Inspection of the specimens of *Cryptotis* in the Biological Survey collection has disclosed several unrecognized forms, among which five from Mexico and Guatemala are here described as new. Two of these forms, it seems clear, are subspecies of *Cryptotis pergracilis*. The other three display no definite intergrading of characters with each other or with any described form, although all have indications of affinity with *Cryptotis mexicana*.

***Cryptotis pergracilis pueblensis*, subsp. nov.**

Type-specimen.—No. 92720, U. S. National Museum, Biological Survey collection; ♂ adult (teeth slightly worn), skin and skull; collected January 6, 1898, by E. A. Goldman. Original number 12014 (Nelson and Goldman catalog).

Type-locality.—Huachinango, altitude 5000 feet, State of Puebla, Mexico.

Diagnostic characters.—About the size of *Cryptotis pergracilis pergracilis*, color distinctly darker; skull heavier, broader interorbitally, with noticeably wider rostrum and broader molariform teeth. Darker and more reddish than the new form from the State of Nayarit, with smaller and flatter skull.

Color.—Upperparts most nearly mummy brown¹; underparts grayish, washed heavily with buffy brown.

Measurements.—Type-specimen: Total length, 85; tail vertebrae, 22; hind foot, 13. Skull of type-specimen: Condylbasal length, 16.2; palatal length, 7.2; cranial breadth, 8.3; interorbital breadth, 4.1; maxillary breadth, 5.3; maxillary tooth row, 6.0.

***Cryptotis pergracilis nayaritensis*, subsp. nov.**

Type-specimen.—No. 88015, U. S. National Museum, Biological Survey collection; ♂ adult (teeth slightly worn), skin and skull; collected April 13, 1897, by E. W. Nelson and E. A. Goldman. Original number 10902.

¹Colors are those as given by R. Ridgway, Color Standards and Color Nomenclature, 1912.

Type-locality.—Tepic, altitude 3000 feet, State of Nayarit, Mexico.

Diagnostic characters.—Near *Cryptotis pergracilis pergracilis* in size, the general color darker and more reddish brown, less grayish, the underparts suffused with cinnamon-buff. Paler and more reddish than *Cryptotis pergracilis pueblensis*, the underparts more tinged with cinnamon-buff or tawny olive. Skull larger and heavier, and with heavier rostrum than that of *Cryptotis p. pueblensis*; decidedly heavier than that of *Cryptotis p. pergracilis* or *Cryptotis p. macer*; dentition heavy, about as in *Cryptotis p. pueblensis*, much heavier than in *Cryptotis p. pergracilis*, the third unicuspid relatively small as in *Cryptotis p. pueblensis*.

Color.—Upperparts Prout's brown or possibly a shade darker; underparts grayish suffused with cinnamon-buff or tawny-olive.

Measurements.—Type-specimen: Total length, 80; tail vertebrae, 22; hind foot, 12. Skull of type-specimen: Condylbasal length, 17.0; palatal length, 7.1; cranial breadth, 8.6; interorbital breadth, 4.1; maxillary breadth, 5.7; maxillary tooth row, 6.3.

Cryptotis guerrerensis, sp. nov.

Type-specimen.—No. 126895, U. S. National Museum, Biological Survey collection; ♀ adult (teeth moderately worn), skin and skull; collected May 17, 1903, by E. W. Nelson and E. A. Goldman. Original number 16429.

Type-locality.—Omiteme, altitude about 8000 feet, State of Guerrero, Mexico.

Diagnostic characters.—A *Cryptotis* of the *mexicana* group, essentially like *Cryptotis mexicana goldmani* in color, possibly averaging a shade darker; paler than *Cryptotis mexicana mexicana*; larger than *goldmani*, with distinctly larger feet, possibly larger than *Cryptotis m. mexicana*; skull larger and much heavier than that of *goldmani*, relatively and actually wider interorbitally, with wider and heavier rostrum; molariform teeth slightly wider than in *goldmani*. Upper molariform teeth more deeply emarginate posteriorly than in *Cryptotis m. mexicana*.

Color.—Upperparts between sepia and clove brown, or a shade darker; underparts hair brown or between hair brown and drab in general tone, washed with drab.

Measurements.—Type-specimen: Total length, 110; tail vertebrae, 32; hind foot, 14.5. Skull of type-specimen: Condylbasal length, 20.0; palatal length, 8.6; cranial breadth, 10.4; interorbital breadth, 5.3; maxillary breadth, 6.6; maxillary tooth row, 7.4.

Cryptotis griseoventris, sp. nov.

Type-specimen.—No. 75894, U. S. National Museum, Biological Survey collection; ♂ adult (teeth very slightly worn), skin and skull; collected October 4, 1895, by E. W. Nelson and E. A. Goldman. Original number 8545.

Type-locality.—San Cristobal, altitude 9500 feet, State of Chiapas, Mexico.

Diagnostic characters.—Somewhat darker and more grayish (less reddish) than *Cryptotis mexicana mexicana*, particularly ventrally; in fact, slightly more plumbeous ventrally than any other known member of the *mexicana* group. Skull larger than that of *Cryptotis m. mexicana*, superficially resembling that of *Cryptotis guerrensis* but with narrower cranium and rostrum.

Color.—Upperparts near clove brown but darker; underparts between clove brown and chaetura drab.

Measurements.—Type-specimen: Total length, 110; tail vertebrae, 30; hind foot, 14.5. Skull of type-specimen: Condylbasal length, 20.0; palatal length, 8.7; cranial breadth, 10.2; interorbital breadth, 5.2; maxillary breadth, 6.2; maxillary tooth row, 7.3.

***Cryptotis goodwini*,² sp. nov.**

Type-specimen.—No. 77074, U. S. National Museum, Biological Survey collection; ♂ adult (teeth moderately worn), skin and skull; collected January 13, 1896, by E. W. Nelson and E. A. Goldman. Original number 9073.

Type-locality.—Calel, altitude 10200 feet, Guatemala.

Diagnostic characters.—A large *Cryptotis*, apparently of the *mexicana* group, and of the Mexican and Central American members of the genus exceeded in size only by *Cryptotis magna*. In color not essentially different from *Cryptotis mexicana mexicana*, but contrastedly larger than that form or than *Cryptotis griseoventris*. Cranium deep, broadly expanded; rostrum broad; molariform teeth broad and heavy, deeply pigmented.

Color.—Upperparts somewhat darker than clove brown; underparts almost olive brown in general effect, mixed with grayish.

Measurements.—Type-specimen: Total length, 117; tail vertebrae, 28; hind foot, 15.5. Skull of type-specimen: Condylbasal length, 21.3; palatal length, 9.1; cranial breadth, 11.1; interorbital breadth, 5.7; maxillary breadth, 7.1; maxillary tooth row, 8.0.

²Named for George G. Goodwin of the American Museum of Natural History, in recognition of his interest in Guatemalan mammals and who suspected the present form as new on the basis of a single imperfect specimen from Teepam, Guatemala, in the collection of the American Museum.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SPECIES OF PELTOSTIGMA FROM MEXICO.¹

BY C. V. MORTON.

Among the interesting plants collected by Mrs. Ynes Mexía in the Mexican state of Jalisco is a remarkable new species of *Peltostigma* (Rutaceae-Xanthoxyleae), a genus previously believed to be monotypic.

***Peltostigma eximium* Morton, sp. nov.**

Arbor parva, erecta; ramuli glabri, nitidi, lenticellis nullis; folia digitata, 5-foliolata, alterna, longe petiolata, petiolis 6-6.5 cm. longis, ca. 1.5 mm. crassis, teretibus, glabris, foliolis oblanceolatis, foliolo terminali maxime 12 cm. longo et 4 cm. lato, foliolis exterioribus multo minoribus, maxime 6 cm. longis et 2 cm. latis, omnibus breviter petiolulatis, apice breviter acuminatis, basi longe attenuatis, margine integris, utrinque glabris, glanduloso-punctatis, nervo medio supra impresso, subtus leviter elevato, nervis lateralibus primariis 10-12, vix prominentibus, arcuatis et anastomosantibus; pedunculus 4.5-6 cm. longus, glaber, teres, apice articulatus, 1-3-florus, pedicellis 1-1.5 cm. longis, glabris, basi bracteatis, bracteis deciduis; sepala 4, reniformia vel orbicularia, valde irregularia, intimo maximo, petaloideo, ca. 5 mm. longo et 10 mm. lato, omnia purpurascentia, glabra, breviter ciliata; petala 4, obovata, concava, reflexa, maxime 1.7 cm. longa et 1.6 cm. lata, extus purpurascentia, intus alba, utrinque glabra, margine sparse ciliata; stamina valde numerosa (saltem 100), filamentis liberis, ca. 1 cm. longis, crassis, haud subulatis, apice valde corrugatis, quam antheris latioribus, disco insertis, multiseriatis, antheris ellipticis, ca. 2 mm. longis, basi sagittatis, loculis discretis, connectivo apice mucronato; discus crassus, ca. 1.5 mm. altus, glanduloso-tuberculatus, glandulis magnis, numerosis, pubescentibus; ovarium 8-9-loculatum, 8-9-lobatum, dense sericeum; stigmata 8-9, magna, crassissima, colorata; capsula 8-9-loculata, ca. 3 cm. lata, 2.2 cm. alta, coccis liberis, nonnullis abortivis, sparse pilosis, apice rostratis (rostro 2-lobato), dorso leviter carinatis, marginibus alatis, intus valde reticulato-venosis; endocarpium solutum, cartilagineum, flavum; semina in loculis 2, superposita, uno plus minus abortivo, reniformia, ca. 8.5 mm. longa, 5 mm. lata, glabra.

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Type in the U. S. National Herbarium, no. 1,317,919, collected at Arroyo del Triangulo, San Sebastián, Sierra Madre Occidental, Jalisco, Mexico, alt. 1,425 meters, Mar. 20, 1927, by Mrs. Ynes Mexía (no. 1902).

Peltostigma eximium differs from the previously known species, *P. pteleioides* (Hook.) Walp., in numerous characters, summarized in the following key:

- Filaments equal throughout, not subulate, broader at apex than the anthers, multiseriate; sepals glabrous; petals glabrous, maroon-colored externally, white within, reflexed; capsules sparingly short-pilose.....*P. eximium*
- Filaments subulate, much narrower at apex than the anthers; sepals sericeous; petals sericeous, cream-colored, spreading but not reflexed; capsules densely yellow-sericeous, at least on the sides of the cocci.....*P. pteleioides*

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SPECIES OF *RAJANIA* FROM CUBA.¹

BY C. V. MORTON.

The following new species of *Rajania* (Dioscoreaceae) from Cuba was detected in a small collection sent recently by the New York Botanical Garden for identification.

***Rajania wilsoniana* Morton, sp. nov.**

Caulis altescendens, 4.5-6 m. longus, basi lignosus, sursum herbaceus; rami graciles, ca. 1.5 mm. crassi, sinistrorsum volubiles, pallido-virides, striati, juventute pilosuli, mox glabrati, internodiis usque ad 7 cm. longis; folia alterna, ovata, maxime 7 cm. longa et 4 cm. lata, basi late cuneata vel subtruncata, apice obtusa, mucronata (mucrone ca. 1 mm. longo), integra, haud lobata, punctato-lineolata, supra glabra vel juventute parce strigosa, subtus ubique pilosula (pilis ca. 0.5 mm. longis, albis, rectis), 5-nervata, nervis extimis fere marginalibus, 3 mediis aream oblongam determinantibus; petioli 3-8 mm. longi, crassi, canaliculati, parce pilosuli; inflorescentiae ♂ solitariae, axillares, ca. 4.5 cm. longae, rhachibus gracillimis, pilosulis, membranaceo-alatis; flores in cymulis solitariis vel binis ca. 5-floris congesti, pedicellati, pedicellis inferioribus ca. 1 mm. longis, pilosulis; perianthium campanulatum, ca. 0.75 mm. longum, vix 2 mm. latum, ultra medium partitum, pilosulum; stamina 6, fundo perianthii affixa, filamentis compressis, ca. 0.25 mm. longis, antheris minutis, loculis contiguis; fructus 10-11 mm. longus, ca. 5 mm. latus, breviter nigro-lineatus, apice rotundatus; pedicelli fructiferi ca. 3 mm. longi, gracillimi.

Type a staminate plant in the herbarium of the New York Botanical Garden, collected at Limones, Soledad, Cienfuegos, Prov. Santa Clara, Cuba, July 18, 1929, by J. G. Jack (no. 7489). The fruit is described from a second collection at the type locality, Nov. 2, 1928, Jack 6584.

Named in honor of Mr. Percy Wilson, of the New York Botanical Garden, in recognition of his numerous contributions to the flora of Cuba.

Rajania wilsoniana is apparently most nearly allied to *R. pilifera* Urban, of Hispaniola. The two species may be separated as follows:

Leaves subcordate at base, short-acuminate at apex, pilosulous beneath chiefly on the veins and veinlets; corolla 3 mm. wide.

R. pilifera

Leaves broadly cuneate or subtruncate at base, obtuse and mucronate at apex, pilosulous over the whole lower surface; corolla 2 mm. wide or less.....

R. wilsoniana

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PROCEEDINGS
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TWO NEW SPECIES OF *HIRAEA* FROM COLOMBIA.¹

BY C. V. MORTON.

The following two species were detected in the course of identifying recent South American collections of Malpighiaceae in the U. S. National Herbarium. The genus *Hiraea* is well marked, and the species are for the most part easily distinguishable.

Hiraea sanctae-marthae Morton, sp. nov.

Sect. *Tetractinia*, subsect. *Leptopterys*, ser. *Leptopetalis*; rami novelli angulati, dense sericei, pilis flavidis appressis nitentibus, demum glabri, ca. 3 mm. diametro, internodiis 2-3 cm. longis; lamina foliorum elliptico-obovata, 8.5-9 cm. longa, 4-4.5 cm. lata (adultae non suppetunt), chartacea, margine integra, eglandulifera, basi cordata, apice obtusa, supra viridis nitida juventute pilis tenuibus hyalinis sericeo-strigosa sed mox glabrata, subtus alba densissime sericea, nervis primariis utrinque ca. 7 supra depressis vix prominulis, subtus elevatis, nervis secundariis utrinque haud prominulis; petiolus teres, 7-9 mm. longus, ca. 1.5 mm. diametro, dense griseo-strigosus, apice 2 glandulis magnis instructus; stipulae subulatae ca. 2.5 mm. longae, dense sericeae, basi petioli affixae; umbellae nunc 3 in corymbos abbreviatis ca. 2.5 cm. longos dispositae nunc usque 3 ad axillas confertae, pedunculi internodio inferiore 0-2 mm. longo, crasso, dense brunneo-pubescente, superiore 5-7 mm. longo, ca. 1 mm. diametro, pedicellis gracilibus, 12-25 mm. longis, vix 0.5 mm. diametro, apice non incrassatis, dense brunneo-sericeis, bracteis bracteolisque triangularibus acutis, 1-1.5 mm. longis, dense pubescentibus; flores ca. 13 mm. diametro; sepala ovata, ca. 2 mm. longa, basi 1.5 mm. lata, apice obtusa, rotundata, incurva, eglandulifera, extus dense sericea; petala membranacea, reflexa, limbo ovali 5-6 mm. longo, basi abrupte breviter cuneato, margine denticulato, paullo glanduloso, concavo, glabro, quinti glanduloso-fimbriato, ungue 1.5-2 mm. longo; androeceum zygomorphum, filamentis inaequilongis exsertis gracillimis curvatis glabris basi dilatatis connatis, antheris subsphaeroideis, loculis contiguis parallelis glabris ca. 1 mm. longis, connectivo crasso glabro; styli exserti curvati sigmoidei

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apice uncinati glabri, anticus 2 posticis longior crassior rector et magis uncinatus; ovarium hirsutum; samarae non suppetunt.

Type in the U. S. National Herbarium, no. 1,283,260, collected at Río Frío, Quebrada Rodriguez, Santa Marta, Colombia, Mar. 15, 1925, by Fred Walker (no. 1211).

Four species of *Hiraea* have been reported to occur in Santa Marta, viz: *H. reclinata* Jacq., *H. velutina* Ndzu., *H. transiens* Ndzu., and *H. opulifolia* (Rusby) Ndzu. The first of these differs from *Hiraea sanctae-marthae* in its more coriaceous leaves, which are nearly glabrous beneath except on the midvein, and in its larger flowers. *H. velutina* is more closely related, differing in its velutinous-tomentose under leaf-surface (rather than silvery-sericeous) and in its stipules, which are borne considerably above the base of the petiole. The Santa Marta record for this species is based on *H. H. Smith* 1514. The sheet of this number in the U. S. National Herbarium is a mixture of perhaps three species, probably none of which is *H. velutina*. The largest specimen is quite typical *Hiraea sanctae-marthae*. *H. transiens* has glabrate leaves and long petioles stipulate near the apex. The remaining species, *Hiraea opulifolia*, is known to me from description only, but it must be quite unrelated to the group of species here discussed.

***Hiraea colombiana* Morton, sp. nov.**

Subg. *Archihiraea*; liana altescandens, ramis rugosis, ca. 6 mm. diametro, brunneis glabris, ramulis foliiferis ad apicem versus densissime pubescentibus, pilis medio semel furcatis hyalinis compressis; lamina foliorum late elliptica, maxime 17.5 cm. longa, ca. 11 cm. lata, vel anguste elliptica (*Killip & Smith* 19824), maxime 18 cm. longa, 8 cm. lata, basi cordata, apice obtusa vel leviter apiculata, subcoriacea, supra juventute dense strigosa, pilis basi semel furcatis, demum glabrata, pilis paucis persistentibus, subtus adulta dense strigosa, pilis albidis basi vel supra basin furcatis appressis, margine integra plana glandulis paucis instructa, costa nervis primariisque (his ca. 11 utrinque) supra depressis arcuatis infra marginem confluentibus, subtus valde prominentibus elevatis, nervis secundariis inter se parallelis, supra depressis prominulis, subtus elevatis prominentibus; petiolus brevissimus, maxime ca. 9 mm. longus, 3–4 mm. diametro, densissime pubescens, pilis eis ramulorum similibus; stipulae binae lineari-subulatae, ca. 4 mm. longae, dense pubescentes, apicem petioli versus affixae; umbellae axillares, simplices, multi- (usque 14-) florum, pedunculo internodiis 2 diviso, inferiore 20–25 mm. longo, 1.5–2 mm. diametro, densissime pubescente, apice 2 foliolos parvos ellipticos petiolulatos gerente, superiore brevior, 7–9 mm. longo, pedicellis sessilibus, 17–20 mm. longis, basi ca. 0.8 mm. diametro, apice incrassatis, ca. 1.5 mm. diametro, dense pubescentibus; flores ca. 1 cm. diametro; sepala crassa, ovata, incurvata, ca. 3 mm. longa, basi ca. 2 mm. lata, acuta, extus dense pubescentia, glandulas 10 ovaes 2 mm. longas ca. 0.6 mm. latas gerentia; petala reflexa lutea membranacea, limbo orbiculari cochleariformi, ca. 4 mm. longo, basi cordato, margine leviter denticulato, quinti erecto longe fimbriato, ungue ca. 2 mm. longo, quinti ca. 3 mm. longo; androeceum actinomorphy, staminibus directis aequaliter inter se distantibus, filamentis ca. 1 mm.

altis basi connatis, minoribus petalis oppositis ca. 2.5 mm. longis, majoribus sepalis oppositis ca. 3 mm. longis, apicem versus attenuatis, gracilibus, glabris, antheris ovalibus aequalibus ca. 1 mm. longis, 0.5 mm. latis, connectivo crassiusculo glabro, loculis parallelis glabris; styli directi aequales, ca. 2 mm. longi, apice simpliciter obtusi nec uncinati nec dilatati, glabri; ovarium hirsutum; nux sphaeroidea, ca. 7 mm. diametro, dense griseo-pubescens, areola ventrali orbiculari, ca. 2 mm. diametro; alae laterales ovals, 4–4.5 cm. altae, 2–2.2 cm. latae, membranaceae, venosae, dense strigosae, pilis basi furcatis appressis, margine exteriore undulatae; crista dorsalis fere nulla.

Type in the U. S. National Herbarium, no. 1,517,269, collected at the edge of woods near Loso, north of Toledo, Eastern Cordillera, Dept. Norte de Santander, Colombia, alt. 2,200–2,400 meters, Mar. 6–7, 1927, by E. P. Killip and A. C. Smith (no. 20474). A second specimen is mounted on sheet no. 1,355,512.

The fruit is described from a second collection, this also from the Eastern Cordillera, in thickets along stream on the road from Pamplona to Toledo, crossing the divide between Río La Teja (Maracaibo drainage) and Río Mesme (Orinoco drainage), Dept. Norte de Santander, Colombia, February 28, 1927, by Killip and Smith (no. 19824).

The small subgenus *Archihiraea* contains only four members: *H. spruceana*, *H. brachyptera*, *H. brachypoda*, and the present species. The only one to which *H. colombiana* is related is *H. spruceana*, described from the Río Chasuan, on Chimborazo, Ecuador (*Spruce* 6152), which differs in its golden tomentose young twigs and lower leaf-surfaces, obovate larger leaves (merely rounded at base), and longer petioles, these bearing a pair of stipules near the base. Furthermore, the calyx is 8- (not 10-) glandular and the flowers in an umbel are more numerous.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW TERMITES FROM INDIA.

BY THOMAS E. SNYDER,

*Senior Entomologist, Bureau of Entomology, United States Department of
Agriculture.*

A small collection of termites received from J. C. M. Gardner, systematic entomologist, Forest Research Institute, Dehra Dun, India, contains two new species that are not included among those mentioned in another paper of mine, now in press, on new termites from India. These two new species, described herewith, give India a total of 86 known termites; in continental United States there are 56 known species.

One of these species is in the subgenus *Euhamitermes* Holmg., genus *Amitermes* Silv., represented by *hamatus* Holmg. from Malacca and *indicus* Holmg. from India, and known only from the soldier caste; these termites are very rare and only one colony of each has been found. The other new species is in the genus *Microtermes* Wasm. and may be the sexual form of a species known only from the soldier caste, although it is very different from any known sexual form.

Both new species were found in a mound nest of *Termes* (*Cyclotermes*) *obesus* Ramb. The king and queen of the new *Microtermes* were in a cell about 1½ feet above the ground level. It is not known from what part of the nest the soldier of the new *Euhamitermes* was found.

The king and queen of the host termite, a common fungus-growing species, were also collected. There is a marked contrast between the *Termes* and *Microtermes* queens. The *obesus* queen is an old, physogastric, macropterous female, 68 mm. in length and 17 mm. in width. The usual dark, longitudinal streak runs down the middle of the dorsal area, as is characteristic of old *obesus* queens. In older and larger queens (over

100 mm. in length and 25 mm. in width) of African termites in the *Termes* group, this blackish area is not present. Such queens are over 160 times the size of the king, as determined by volumetric displacement, whereas this *obesus* queen has only 75 times the volume of the king.

Descriptions of the new species follow:

***Microtermes unicolor*, n. sp.**

King (slightly physogastric, dealated male).—Head castaneous brown, with dense long hairs, the bases of which appear as white dots. Post-clypeus yellow, strongly bulging and bilobed, length about half its width. Labrum yellow, tongue-shaped. Fontanelle a raised white spot at the convergence of the lines from the ocelli to the vertex, namely, at the beginning of the epicranial suture.

Eyes black, large (small in *sindensis* Desn.), projecting, not round, very close to lateral margin of head. Ocelli white, large, suboval, separated from eyes by a distance less than half the short diameter of ocellus and at an oblique angle to eyes.

Antennae with 13 segments (broken?), second slightly longer than third and fourth segments, which are subequal.

Pronotum of about the same color as the head and with the same pubescence; subcordate; sharply and deeply, but narrowly, emarginate anteriorly; shallowly and angularly emarginate posteriorly with a T-shaped or shallow Y-shaped white median marking and an ocellus-like marking on the upper corner of each lobe.

Anterior wing scale slightly longer than posterior.

Meso- and meta-nota slightly lighter colored than pronotum; unlike in *obesi* Holmg., the fore part of the meso- and the meta-notum is lighter colored than the hind part; the mesonotum is more deeply incised posteriorly than the metanotum.

The meso- and meta-thoracic legs are missing on the left side, and there is a black bite scar on the mesothoracic coxa.

Abdomen with a slightly grayish tinge, an ocellus-like marking on the side of each tergite; tergites with dense long hairs.

<i>Measurements.</i> —Length of entire dealated adult.....	8.00 mm.
Length of head (to tip of labrum).....	2.20 mm.
Length of pronotum.....	0.90 mm.
Length of hind tibia.....	1.40 mm.
Long diameter of eye.....	0.40 mm.
Width of head (at eye)	1.45 mm.
Width of pronotum.....	1.35 mm.

Queen (physogastric, dealated female).—Slightly lighter in color than king, but the color of both kings and queens is often lighter than that of the winged adults. Length 20 mm., width 2.8 mm., height 1.9 mm.; very elongate in relation to thickness, wider than high, in consequence present-

ing a somewhat flattened appearance. A longitudinal yellow streak runs down the middle of the dorsal area.

Antennae with 13 segments (broken?).

Distinct, owing to the uniform dark color of head and pronotum; compared with cotype of *obesi*.

Type locality.—Dehra Dun, U. P., India.

Described from a king and queen collected at the type locality by J. C. M. Gardner, "26, IX, '32 ex termite mound, S. E. 1236/6, tube 31."

Cotypes.—King, tube 31 in British Museum; queen, Cat. No. 44878, U. S. National Museum.

Amitermes (*Euhamitermes*) *lighti*, n. sp.

Soldier.—Head yellow, quadrangular, longer than broad, fairly thick, not narrowed anteriorly, with fairly long bristles and a conspicuous mat of short hairs from which the longer bristles stand out.

Mandibles brown, relatively short, heavy, and strongly bowed. A pointed marginal tooth in middle of each mandible, which appears somewhat to be the point of a broad molar, point more projecting on left mandible. Antennae with 14 segments; segments as in *indicus*.

<i>Measurements</i> .—Length of entire soldier.....	4.90 mm.
Length of head with mandibles.....	2.40 mm.
Length of head to anterior margin.....	1.70 mm.
Length of left mandible.....	0.70 mm.
Length of pronotum	0.40 mm.
Length of hind tibia.....	0.90 mm.
Width of head.....	1.29 mm.
Length of pronotum.....	0.65 mm.

Dr. A. E. Emerson, of the University of Chicago, has kindly compared this new species with cotypes of *hamatus* and *indicus*.

The head of *lighti* is larger than that of *hamatus* and the dentition of the left mandible appears to be different; the pilosity appears to be similar, but the cotype is in poor condition. The head of *lighti* is shorter and broader than that of *indicus*, and *indicus* does not have the rather thick mat of short hairs in addition to the longer bristles. A *indicus* has a very few short hairs. There are differences in the size of the head and *lighti* has a wider gula; cotype of *indicus* in poor condition.

Named in honor of Dr. S. F. Light, of the University of California, who has recently added greatly to our knowledge of the genus *Amitermes*.

Type locality.—Dehra Dun, U. P., India.

Described from a soldier collected in a mound of *T. (C.) obesus* at the type locality by J. C. M. Gardner, "26, IX, 32, ex termite mound, S. E. 1266/6, tube 31."

Holotype, soldier.—Cat. No. 44879, U. S. National Museum.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW GENUS OF WEST INDIAN COCCINELLIDAE
(COLEOPTERA).

BY EDWARD A. CHAPIN,

Taxonomic Investigations, U. S. Department of Agriculture.

Recently Dr. George N. Wolcott of the Insular Experiment Station, Rio Piedras, Puerto Rico, submitted a series of adult specimens of a coccinellid which had been reared from larvae found attacking *Icerya purchasi* Mask. at Dorado, Puerto Rico. At the same time larvae were submitted to Dr. A. G. Böving, who will describe them in a subsequent paper.

At first glance the species appears to be related to *Rodolia* Muls., and further, its anatomical characters are not in accord with those of the species of *Scymnus* known to the writer in dissected specimens. However, since Dr. Böving's study showed the larva to be undoubtedly scymnine in its affinities, certain of the West Indian species were studied as dissections in balsam. It is now evident that a small group of species inhabiting this region should be withdrawn from *Diomus* Muls. and be given a separate name.

Diomus thoracicus Fabr., type of the genus *Diomus*, and other species including *D. roseicollis* Muls. of the West Indies, possess antennae of eleven segments (fig. 2) and tarsi of four segments (fig. 1). The new group, to which I assign the name *Decadiomus*, is immediately distinguished from *Diomus* by having ten-segmented antennae (fig. 4) and three-segmented tarsi (fig. 3).

In addition to the type species, *Scymnus* (*Diomus*) *bahamicus* Casey 1899, there are four species before the writer, all of which appear to be undescribed.

Decadiomus n. gen.

Small to minute Scymnini, with antennae short, composed of ten segments, first segment more or less inflated, second globose, third as long as the three succeeding combined, seventh a little longer and wider than sixth, eighth to tenth forming a distinct club. Mandible with apex bifid, outer margin arcuate, basal tooth subacute, notch triangular to rectangular, cutting edge between apical tooth and notch very finely serrate or smooth. Maxilla with lacinia and galea, neither of which is terminated with a spinous or hook-like process, maxillary palpus of usual form, terminal segment securiform, without special sensory pits or spines on outer face. Ligula truncate at apex, bearing four long setae evenly spaced across truncature, lateral portions thickly studded with denticles. Labial palpus two-segmented, the apical segment obtusely conical, shorter and narrower than basal segment. Clypeus broadly rounded. Epistoma slightly prolonged. Pronotum narrower at base than elytra. Elytra with epipleura moderately wide at base, strongly narrowed apically, without impressions to receive legs. Abdomen with six visible ventral segments. Metacoxal arcs joining posterior margin of first sternite at lateral thirds. Legs short, femora not noticeably inflated, reaching lateral margins of body when extended, tarsi three-segmented, claws toothed at base. Body covered with fine, short pile.

Type of genus: *Diomus bahamicus* Casey 1899.

The species included are all of pale coloration ornamented with dark spots.

1. Elytron finely, densely but indistinctly punctured, pubescence moderately dense and short.....2
 Elytron coarsely and sparsely punctured, pubescence sparse and comparatively long.....4
2. Elytron never with an isolated dark spot on apical third, base of pronotum usually (always?) narrowly dark across middle, scutellum dark; length 1.08–1.32 mm.....*bahamicus* Csy.
 Elytron with an isolated oval dark spot on apical third at middle of width, and with a scutellar spot, pronotum and scutellum entirely pale.....3
3. Humeral callus prominent and strongly shining in contrast with rest of elytron, epipleura narrowed suddenly at end of basal half; length 1.32–1.62 mm.....*pictus* n. sp.
 Humeral callus neither prominent nor strongly shining, epipleura narrowed suddenly at beginning of apical third; length 1.32 mm.....*hubbardi* n. sp.
4. Marginal groove of elytron coarsely punctured in middle third of its length, elytra each with a postmedian triangular dark spot and with a common scutellar spot which is tri-cuspidate posteriorly; length 1 mm.....*tricuspis* n. sp.
 Marginal groove of elytron impunctate throughout its length, elytra with a common scutellar spot, varying in size, which, when large, includes two small, round, pale spots; length 1.08 mm.....*peltatus* n. sp.

Specimens of the species *hubbardi*, *tricuspis*, and *peltatus* have not been dissected because of insufficient material. It is possible that the last two may prove to be generically different from *D. bahamicus* Csy.

Decadiomus bahamicus (Casey).

Figs. 3, 4, 6.

Diomus bahamicus Casey, 1899, Journ. N. Y. Ent. Soc., Vol. 7, p. 159.

Diomus putus Casey, 1899, Journ. N. Y. Ent. Soc., Vol. 7, p. 159.

Thirty-four specimens of this species are available to me for study. The series includes the following:

Bahamas, Eleuthera, July 9–15, H. F. Wickham (type and two paratypes of *D. bahamicus* Csy.—three specimens.

Bahamas, Egg Is. May 13, H. F. Wickham (paratype of *D. bahamicus* Csy. and type of *D. putus* Csy.)—two specimens.

Cuba, Prov. Habana, Santiago de las Vegas, July 14, 1930, S. C. Bruner (E. E. A. de Cuba 9382); Feb. 10, 14, 21, Mar. 3, 14, A. Otero (E. E. A. de Cuba 9544)—seven specimens.

Cuba, Prov. Santa Clara, Cayamas, Dec. 29, 30, Jan. 2, 3, 23, 26, Feb. 10, 24, 26, 28, Mar. 2, May 9, July 6, 7, E. A. Schwarz—twenty specimens.

Cuba, Prov. Habana, San Antonio de los Baños, J. H. Pazos—one specimen.
Rep. Dominicana, north of San Cristobal, July 27, 1917, H. Morrison (No. 377)—one specimen.

Decadiomus pictus n. sp.

Fig. 10.

Body small, elliptical to nearly circular, flesh-pink to red, ornamented with piceous to black markings. Head somewhat shining, very finely and rather sparsely punctured, uniformly pale. Eyes large and prominent, though partially concealed beneath anterior angles of pronotum. Pronotum transverse, sides narrowly rounded, slightly narrower across anterior than across posterior angles, surface finely and sparsely punctured, feebly shining, uniformly pale. Scutellum pale. Elytra more strongly and distinctly punctured, humeral callus prominent and shining. Each elytron bears two dark spots, one at the base lying between the humeral callus and the scutellum and extending backward about one fifth the length of the elytron, the pair of spots (on the two elytra) usually flowing together to form a cordate spot, the apex of which lies on the suture at about the basal third. The second spot, slightly postmedian, is roughly circular or elliptical with the long dimension parallel to the long dimension of the beetle. Rarely does this pair of spots join across the suture. Under parts feebly shining. Metathorax sometimes infuscate, first abdominal sternite as long as second and third combined, suture between first and second distinct.

Length 1.6 mm., breadth 1.1 mm., altitude 0.6 mm. (measurements of type specimen).

Type and five paratypes (U. S. N. M. Cat. No. 44714), one of which is

mounted on slide in euparal, from Dorado, Puerto Rico, collected as larvae July 11, 1932, and reared by Mr. Sein. The larvae were found feeding on *Icerya purchasi* Mas. Three paratypes, same data, returned to Doctor Wolcott.

***Decadiomus hubbardi* n. sp.**

Fig. 7.

Body small, oval, yellow-testaceous, ornamented with three piceous spots. Head strongly shining, sparsely and rather coarsely punctured, eyes prominent. Pronotum transverse, sides straight and convergent from the obtuse posterior angles to the broadly rounded anterior angles, surface shining, rather sparsely punctured at sides, more sparsely so on disc. Scutellum pale. Elytra shining, distinctly but not deeply punctured, humeral callus not especially prominent. Maculation as follows: A large cordate scutellar spot reaching to middle of base of each elytron and posteriorly to near basal third of suture, and on each elytron a small nearly circular spot near apical third at middle of width. Under parts shining, thorax not visibly punctured, abdominal sternites moderately coarsely punctured, first and second sternites combined as long as rest of abdomen, suture between first and second not visible.

Length 1.32 mm., breadth 0.9 mm., altitude 0.6 mm.

Type: (U. S. N. M. Cat. No. 44728) from Montserrat, W. I., Apr. 8, 1894, H. G. Hubbard.

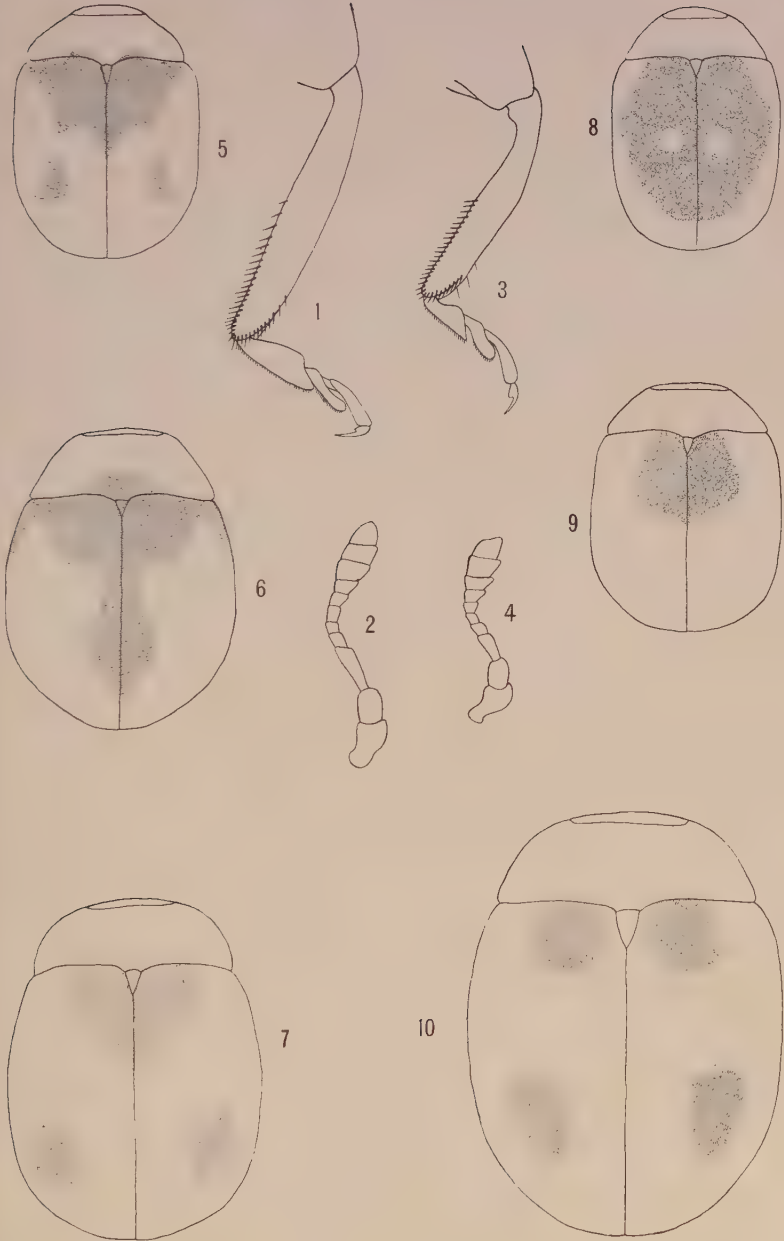
***Decadiomus tricuspis* n. sp.**

Fig. 5.

Body small, oval, very pale stramineous (almost white), ornamented with piceous to almost black markings. Head shining, not visibly punctured, eyes prominent, black. Pronotum transverse, sides narrowly rounded to both anterior and posterior angles, surface shining, not visibly punctured, basal margin on either side of scutellum with small dark spot adjacent to basal elytral spot. Scutellum dark. Elytra shining, coarsely and sparsely punctured, submarginal groove with about ten coarse punctures along middle third of length, epipleura descending. Maculation as follows: A large basal spot which includes the scutellum and which is roughly seven-angulate; basally two angular processes extend onto the pronotum, laterally one process to each humeral callus, posteriorly a long median process along suture to a little beyond basal third, flanked on either side by a shorter process. On apical half, each elytron with a single subtriangular spot which appears to be a continuation of the posterolateral process of the basal spot. Underparts pale, first sternite almost as long as next three combined, suture between first and second distinct.

Length 1 mm., breadth 0.66 mm., altitude 0.48 mm.

Type and two paratypes (U. S. N. M. Cat. No. 44726) from Rio Piedras, Puerto Rico, January 21, 1925, H. L. Dozier, collected on *Carica papaya*, feeding on *Metaleurodicus* sp.



Decadiomus peltatus n. sp.

Figs. 8, 9.

Body small, oval, pale stramineous, ornamented with a single dark scutellar spot. Head shining, not visibly punctured, eyes prominent, black. Pronotum transverse, sides feebly rounded and strongly convergent anteriorly, angles very narrowly rounded. Scutellum dark. Elytra moderately shining, coarsely and sparsely punctured, submarginal groove without coarse punctures, epipleura descending. Color pale, with a dark spot which varies considerably in size. In its greatest development this spot extends along the bases of the elytra nearly to the humeral calli; its greatest width is at the basal fourth, where it is as wide as the distance across the humeri. From this point its margin runs obliquely backward to a point near the suture and at apical third of the length, turning thence to the suture. At about the middle of the length and near the suture each elytron bears a small pale spot. In its least development this spot occupies roughly the sutural third of the basal third of each elytron. Underparts pale, first and second sternites together as long as rest of abdomen, suture between first and second absent across middle.

Length 1.08 mm., breadth 0.7 mm., altitude 0.5 mm.

Type and four paratypes (U. S. N. M. Cat. No. 44727) from Santiago de las Vegas, Habana, Cuba, taken on guava by A. Otero and P. A. Berry, various dates (E. E. A. de Cuba No. 9386). Two paratypes in collection of the Estacion Exp. Agron. Cuba, same data (E. E. A. de Cuba Nos. 9386, 9415).

EXPLANATION OF FIGURES, PLATE I.

- Fig. 1. *Diomus thoracicus* Fabr. Posterior tibia and tarsus.
 2. *Diomus thoracicus* Fabr. Antenna.
 3. *Decadiomus bahamicus* (Csy.). Posterior tibia and tarsus.
 4. *Decadiomus bahamicus* (Csy.). Antenna.
 5. *Decadiomus tricuspis* n. sp. Dorsal view.
 6. *Decadiomus bahamicus* (Csy.). Dorsal view.
 7. *Decadiomus hubbardi* n. sp. Dorsal view.
 8. *Decadiomus peltatus* n. sp. Dorsal view.
 9. *Decadiomus peltatus* n. sp. Dorsal view.
 10. *Decadiomus pictus* n. sp. Dorsal view.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF THE LARVA OF DECADIOMUS
PICTUS CHAPIN (SCYMNINI, COCCINELLIDAE).

BY ADAM G. BÖVING,
U. S. Bureau of Entomology, Washington, D. C.

Three larvae of the coccinellid species *Decadiomus pictus* Chapin were received from Dr. George N. Wolcott, Isabella, Puerto Rico, together with pupae and adults reared from identic larvae. Dr. Wolcott states that this lady beetle was found attacking the cottony cushion scale on *Casuarina* and *Citrus* on Miss Livingstone's place, Dorado, Puerto Rico. Larvae were collected by F. Sein and George N. Wolcott and reared to adults July 11, 1932; additional specimens of larvae and pupae were secured on September 12, 1932. This coccinellid beetle represents, according to Dr. E. A. Chapin, who has described and figured the adult, a new genus and new species of the tribe Scymnini.

***Decadiomus pictus* Chapin.**

(U. S. National Museum; one vial with one larva, one vial with two pupae, and two glass slides with anatomical details of two larvae and one larval skin; specimens marked: "*Decadiomus pictus* Chapin; new genus, new species, P. R. acc. No. 132-133, attacking *Icerya purchasi* Maskell, Miss Livingstone's place, Dorado, Puerto Rico, July 11, 1932, and Sept. 12, 1932, F. Sein and G. N. Wolcott coll.; Dr. G. N. Wolcott, Isabella, Puerto Rico dedit.")

The full-grown larva (figs. 4 and 5) is about 3 mm. long, sub-ovate in outline, tapering forward from metathorax and backward from the sixth abdominal segment, dorsally arched, ventrally rather flat; the tenth abdominal segment is bent downward forming a well developed locomotive sucker. The specimen preserved in alcohol shows the prothorax dorsally light, the head and the entire medio-dorsal part of the rest of the body between the alar areas darker, the lateral and ventral parts light, and the

legs light. The whole larva is concealed under a thick coat of white, woolly wax threads.

The cranium (figs. 4 and 9) (stretched out horizontally in the figures to show its form and proportion to the body) is in its natural position bent downward and its posterior margin is covered by the fleshy anterior part of the prothorax. It is about twice as broad as long, subrectangular with rounded anterior and posterior corners, darkly pigmented, and with the region in which the ocelli are seated darker than the rest.

The labrum (fig. 9) is almost perpendicular, broad with arched surface, and covers the flexed mandibles like an eye shade. Its anterior margin is slightly trilobed, and laterally it is somewhat sclerotized. There are a series of six long setae near the posterior margin and two pairs of smaller setae anteriorly.

The clypeus is not distinct, no epistomal sclerome being developed. The frons is completely fused with the epicranium, and neither frontal nor epicranial sutures are present. There are three large ocelli on each side, arranged in a triangle just behind the antennal foramen.

The antenna (fig. 1) is considerably shorter than the mandible, broadly conical, and attached by a large basal membrane; there are only two antennal joints; the proximal of these is probably composed of the fused basal and second joints of other coccinellid larvae (I+II fig. 1) as it carries a puncture, the landmark of the basal joint, at its posterior margin, and also two setae, the landmark of the second joint, at its anterior margin; the apical joint (III fig. 1) is minute, externally inserted in the membranous top of the proximal joint, and carries a long seta; a tactile filament extending as far as the end of this seta projects from this same membrane on the inner side of the antenna.

The mandibles (fig. 2) are symmetrical, falciform with a simple, strongly bent, acutely pointed apex; the inner margin of each is somewhat sulcate; the lacinia mandibularis is triangular, fairly large, and membranous; a mola-like enlargement is present and particularly hard and dark on the buccal margin toward the well developed hypopharyngeal sclerome, with which it links closely.

The maxillae (fig. 7) are deeply retracted, large, fleshy, and fused with the labium almost for their entire length. The cardo is indistinct, with a splinter-like sclerome (*ca*, fig. 7). The stipes is large, posteriorly fused with the cardo, and membranous except anteriorly where the margin is marked by a thin sclerome that is somewhat triangularly enlarged in the corner toward the labium and from here prolonged into a pair of fine rods for the support of the inner face of the maxillary mala (fig. 10). The mala is an entire, large, obtusely rounded, membranous, and whitish lobe covered proximally on the ventral surface by a thin, dark plate in which three long setae are inserted; distally, and mainly on the dorsal surface, are three small cylindrical pegs and one larger tactile projection. The palpiger is rather large and entirely membranous. The maxillary palpus is stout and conical; it consists of only three distinct joints, the subapical joint, normally present in other coccinellid larvae, being eliminated and merely indicated by the long seta that characterizes it; the prebasal joint has the



DECADIOMUS

ordinary form and is, as usual, without setae; the basal joint is also typical, having a sickle-shaped sclerome that carries a single, long seta ventrally at the end of the sclerome.

The labium (fig. 7), only apically free, is large and fleshy, with submentum, mentum, and prementum completely fused. The labial palpus is distinctly two-jointed, with a short, wide, basal joint and a long, conical, apical joint terminally provided with tactile papillae. The ligula is indistinct.

The body (fig. 4) is entirely without scleromes or setae bearing verrucae. Dorsally and laterally the segments are covered densely with minute pointed papillae. There are many rather short, fine, soft, and irregularly distributed setae, and several cylindrical, peg-like organs with curved, obtuse, clear ends (*cyl. p.*, fig. 4). Dorsally on each side of the mesothorax and metathorax is a long, exteriorly curved, secretory slit garnished with a row of long, stiff, pointed setae, and dorsally on the abdominal segments are many circular secretory spots (*ss*, fig. 6). In the skin between the metathorax and the first abdominal segment, and between the rest of the abdominal segments, except the last two, are found large, spindle shaped foveae (*fo*, fig. 6), which secrete bloodlike fluid (haemorrhœe or blood secretion).

The spiracles are small, circular, and belong to the annular type; they occur on the mesothorax and the first eight abdominal segments. The spiracular tracheae are provided with double-armed closing apparatus (fig. 8) situated comparatively far inside of the spiracles.

The legs (fig. 3) are well developed, lightly sclerotized, and of about equal length. They articulate with thin riblike episternal and epimeral scleromes. Each leg consists of a large, obliquely inserted coxa, a distinct trochanter, a somewhat cylindrical femur, about as long as, but more slender than coxa, a slightly longer and slender tibio-tarsal piece,¹ that tapers toward the ungulus.¹ This latter is short, curved, with a broad base and long point. It is surrounded by five long, capitate bristles from the end of the tibio-tarsus, and itself carries a short seta at the base of its concave inner side. The setae on the other parts of the leg are few and of average length. Of particular interest are their number and arrangement on the tibia-tarsus where, besides the already mentioned five capitate, terminal setae, there are three equidistant normal setae on the exterior face and three on the interior face; in no case are the setal cups carried on top of small tubercles.

It has not been found necessary to offer a full description of the proportional dimensions, the pigmentation, and the whole chaetotaxy of the cranium, mouth parts, body, and legs, as these details are shown on the

¹In substituting the term "tibio-tarsus" for the term "tibia," formerly applied by me, and "ungulus" instead of "clawshaped tarsus," I am following Grandi, who has used these terms for many years, for instance, in his "Descrizione di un nuovo Coccinellide africano, *Serangium giffardi* n. sp., 1914." In so doing, I have been influenced by Snodgrass's thorough studies of the scleromes and muscular structures of the legs in insects. (See R. E. Snodgrass: Morphology and Mechanism of the Insect Thorax; Smithsonian Miscellaneous Collections, Vol. 30, No. 1, 1927.)

figures, and in general are of importance only for comparison and identification of the different species of the same genus.

EXPLANATION OF FIGURES, PLATE II

(All the drawings refer to *Decadiomus pictus* Chapin.)

- Fig. 1. Right antenna; *abm*, basal membrane of antenna. Dorsal view.
- Fig. 2. Right mandible; *lm*, lacinia mandibularis; (*mo*), possibly a molar structure. Ventral view.
- Fig. 3. Femur, tibio-tarsus, and ungulus; *S*, levator of tibia; *T*, depressor of tibia; *TbTa*, tibio-tarsus; *Ung*, ungulus (= dactylopodite of Snodgrass); *X*, tendon and muscles of depressor of ungulus.
- Fig. 4. Larva; *cyl. p*, cylindrical peg-like organ; *epl.*, epipleurum; *par*, parascutum. Dorsal view.
- Fig. 5. Larva; *epl.*, epipleurum; *ls*, lateral suture; *par*, parascutum; *pl*, pleurum. Lateral view.
- Fig. 6. Part of skin; *fo*, repugnatorial foveae; *sp*, spiracle; *ss*, secretory spot.
- Fig. 7. Ventral mouthparts; *ca*, cardo; *m*, mentum; *ma*, mala; *mpg*, maxillary palpiger; *pm*, prementum; *sm*, submentum; *st*, stipes maxillae. Ventral view.
- Fig. 8. Closing apparatus.
- Fig. 9. Head. Dorsal view.
- Fig. 10. Right maxilla; *ma*, mala; *mzp*, maxillary palpus; *st*, stipes. Posterior view of tilted maxilla.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

FERN MISCELLANY—II.¹

BY WILLIAM R. MAXON.

The notes here brought together are in continuation of a somewhat longer series previously published² and are of the same general character. They relate to tropical American species.

LOXSOMACEAE.

Loxsomopsis Pearcei (Baker) Maxon.*Dicksonia Pearcei* Baker, Ann. Bot. 5: 197. 1891.*Loxsomopsis Lehmannii* Hieron. Bot. Jahrb. Engler 34: 435. 1904.*Dennstaedtia Pearcei* C. Chr. Ind. Fil. 218. 1905.

The type specimen of *Dicksonia Pearcei* Baker, at Kew, consists of two smallish fronds (without rhizome) collected in the "eastern Andes of Ecuador, at 8,000-9,000 ft." by Pearce (no. 251) and presented by Messrs. Veitch in 1884. It agrees with type material of *Loxsomopsis Lehmannii* from Ecuador (*Lehmann* 506), and the earlier species name must accordingly have precedence, under *Loxsomopsis*.

GLEICHENIACEAE.

Dicranopteris pallescens (Mett.) Maxon.*Gleichenia pallescens* Mett. Ann. Sci. Nat. V. Bot. 2: 267. 1864.

Founded on *Lindig* 273, from Velez, Colombia, of which I have seen an isotype at Kew. Here is to be referred, without doubt, a recent collection by William Seifriz (no. 60), from "Cincinnati," on the lower slopes of Mount San Lorenzo, near Santa Marta, Colombia, alt. 1,300 meters. This is a well-developed plant, somewhat larger than the immature *Lindig* specimen. The under surface is subglaucous merely, like the varietal form mentioned by Mettenius. The segments are 2 to 3 mm. broad, the larger ones 3 to 3.5 cm. long.

POLYPODIACEAE.

Elaphoglossum Hayesii (Mett.) Maxon.*Acrostichum Hayesii* Mett.; Kuhn, Linnaea 36: 43. 1869.

Described from Panama solely on *Hayes* 30, a specimen of which is at

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²Proc. Biol. Soc. Washington 43: 81-88. 1930.

hand. Other Panama specimens are: Barro Colorado Island, C. Z., *Stevens* 640, *Shattuck* 593; between Frijoles and Monte Lirio, C. Z., *Killip* 12135; Baillmona, C. Z., *Stevens* 671; Juan Diaz, Prov. Panama, *Killip* 2594. It is a member of the difficult and variable group of *E. piloselloides* (Presl) Moore.

Polypodium phlegmaria J. Sm. London Journ. Bot. **1**: 194. 1842.

Polypodium towarens Klotzsch, *Linnaea* **20**: 374. 1847.

Polypodium phlegmaria was founded on *Schomburgk* 161, from British Guiana; *P. towarens* on *Moritz* 251, from Tovar, Venezuela. The latter has been reduced to synonymy under *P. phlegmaria* by Christensen, and a comparison of *Moritz* 251 with the type specimen of *P. phlegmaria* (both at the British Museum) shows that this disposition is correct. The following additional specimens are in the National Herbarium: Near Santa Rosa, Dept. Antioquia, Colombia, alt. 1,700–2,000 meters, *Lehmann* 7589; upper slopes of Mount Roraima, *in Thurn* 179. These plants agree closely. The rhizomes bear abundant scales at apex, and the rigidly spongy fronds are glabrous.

At Kew the two British Guiana collections (*Schomburgk* 161 and *in Thurn* 179) are mounted on the same sheet, and are identical. Both, however, are annotated by Baker as *P. towarens*, notwithstanding that *P. phlegmaria* (type, *Schomburgk* 161) has five years' priority. Hieronymus also has identified³ the Colombian collection above cited (*Lehmann* 7589) as *P. towarens*, making no reference whatever to *P. phlegmaria*. Since both Baker and Hieronymus failed to adopt the earlier name the writer remained in doubt as to the correctness of Christensen's treatment, until (in 1930) he was able to examine *Moritz* 251. The name *towarens* was then found to apply without doubt to *P. phlegmaria* rather than to the next species, which superficially is similar.

Polypodium Alfarii Donn. Sm. Bot. Gaz. **33**: 262. 1902.

Polypodium oligosorum Moritz, Bot. Zeit. **12**: 855. 1854, *nomen nudum*; Mett. ex Kuhn, *Linnaea* **36**: 132. 1869. Not *P. oligosorum* Klotzsch, 1847.

The present species, though indicated by Moritz as new (under the name *P. monosorum* Moritz) on the basis of *Moritz* 460, was first actually described as *P. oligosorum* Mett., three collections from Venezuela being cited, viz. *Moritz* 460, *Fendler* 208, *Karsten* 10, of which the first may be regarded as the type. The name *oligosorum* itself is invalid, as shown above. Agreeing with *Moritz* 460, however, there are at hand numerous Costa Rica and Panama specimens (previously identified by the writer as *P. Alfarii*) and two additional South American specimens. It is apparent that the name *P. Alfarii* must be used for the whole series.

In general appearance *P. Alfarii* somewhat suggests *P. phlegmaria* (*P. towarens*), with which it grows in at least one locality, Colonia Tovar. It differs widely from that in many morphological characters, nevertheless,

³Bot. Jahrb. Engler **34**: 502. 1904.

especially in its complete lack of rhizome scales,⁴ its delicately membranous leaf tissue and long-setose sporangia, and its far from glabrous condition, the segments being ciliate and on the lower surface beset with a few long setae and minute branched glandular hairs. It is actually more closely related to *P. Randalli* Maxon,⁵ of Jamaica, and *P. Hombersleyi* Maxon,⁶ of Trinidad, although both of these are diminutive and bear numerous scales upon the rhizome.

The following specimens of *P. Alfarii* are in the National Herbarium:

COSTA RICA: Sierra Alta de Navarro, Prov. Cartago, alt. 1,400 meters, Alfaro (J. D. Smith, no. 8063), type. La Palma, alt. 1,450–1,550 meters, Maxon 394, 429; Standley 38166. San Jerónimo, Werckle (O. Jiménez, no. 569). Volcán de Barba, at 2,600–2,700 meters elevation, M. Valerio A12, 141. Near San Isidro, Prov. Heredia, alt. 2,000–2,400 meters, Standley & J. Valerio 49843, 51558, 52119, 52203, 52233, 52287, 52289.

PANAMA: Cordillera above El Boquete, Prov. Chiriquí, alt. 1,900–2,100 meters, Killip 5315, 5356; Cornman 1297.

VENEZUELA: Colonia Tovar, alt. 2,100 meters, Pittier 10071a; Moritz 460.

ECUADOR: Without special locality, Jameson 790 in part.

Polypodium flagellare Christ, Bull. Herb. Boiss. 4: 660. 1896.

Goniophlebium patens J. Sm. in Seem. Bot. Voy. Herald 230. 1854.

Polypodium patens Hook. Sp. Fil. 5: 23. 1863; not Swartz, 1788.

Smith's type material of *G. patens*, collected in Panama by Seemann, has been examined at Kew and the British Museum, and is well matched by recent Panama specimens, all from the lowlands of the Canal Zone region (Killip 2681a, 2695, 2702; Standley 26174). The name *patens* not being tenable under *Polypodium*, this species must be known as *P. flagellare* Christ, founded on specimens from western Costa Rica, Brolley 2671 (not 2691, as published). Fragments and a photograph of a specimen of the type collection in the Costa Rican National Herbarium are at hand.

Dryopteris blanda (Fée) C. Chr.

Known previously from Mexico, Guatemala, and Costa Rica, this species may now be reported from British Honduras, on specimens collected in 1907 by Prof. M. E. Peck (no. 707).

Dryopteris melanochlaena C. Chr.

This remarkable species, hitherto known only from the type specimen collected near Cobán, Alta Verapaz, Guatemala, by John Donnell Smith (no. 168 in part), may now be reported from eastern Mexico on the basis of an excellent specimen collected at Zacuapam, Veracruz, August, 1929, by C. A. Purpus (no. 13061). The very dark scalelike indusia, beset with rigid whitish cilia, are an excellent diagnostic character.

⁴Mettenius mentions "very minute" rhizome scales, a character which may be taken from the Fendler or Karsten specimens, these not seen by the writer.

⁵Amer. Fern Journ. 18: 46. 1928.

⁶Amer. Fern Journ. 20: 1. 1930.

***Dryopteris paucipinnata* (Donn. Sm.) Maxon.**

Known hitherto only from eastern Guatemala, but now to be reported also from Mexico, the specimens (at Kew) collected near Córdoba, Veracruz, in April, 1889, by H. Fink (nos. 14 and 30), and wrongly identified by Baker as *Nephrodium paludosum* Liebm., i. e., *Dryopteris gongylodes* (Schkuhr) Kuntze. Its relationship has been discussed by Christensen.

***Polystichum Ekmani* Maxon, sp. nov.**

Eupolystichum, e turba *P. echinati* (Gmel.) C. Chr. Rhizoma suberectum, paleis plerumque tenuibus brunnescentibus elongatis vestitum, paleis fuscis amplioribus paucis intermixtis; folia conformia ascendentia, recurvata; stipites crassi, quam laminae paulum breviores; laminae lineares, pinnatae, 35–40 cm. longae, ad basin versus vix angustatae, apice abrupte truncato ca. 2 cm. lato proliferae, gemma magna conspicue paleacea; pinnae 30-jugae, alternae, oblongae, subauriculatae, apice abrupte acutiusculo mucronatae, plerumque biserratae, dentibus inaequalibus, submucronatis, marginibus callosis, nervis subtus prominulis obscure et minutissime substellato-paleaceis; sori uniseriati, mediocres, vetusti, indusiis delapsis.

Rhizome suberect, about 2.5 cm. thick, densely paleaceous, the scales 6–9 mm. long, subentire, mostly lance-attenuate, thin and light brown, a few thick, broader, lustrous, blackish ones intermixed and borne also on the stipe bases. Fronds several, cespitose, recurved-ascending, proliferous, about 65 cm. long, conform; stipes two-thirds as long as the blades, stout (2–2.5 mm. thick), olivaceous, deciduously paleaceous; blades pinnate, 35–40 cm. long, linear, about 6 cm. broad at middle, scarcely narrowed at base, about 2 cm. broad at the truncate proliferous apex, the terminal bud large and conspicuously paleaceous, viviparous; pinnae about 30 pairs, alternate, approximate, horizontal, mostly sessile (basal ones petiolulate), trapeziform-oblong, rounded-subauriculate, mucronate at the abruptly acutish tip, mostly 2–3 cm. long, 1–1.4 cm. broad, biserrate, the major serrations 2–3 mm. broad, 1–2 mm. long, submucronate, with a short erect tooth in the sinuses; leaf tissue coriaceous, dull green, semiopaque, the margins cartilaginous; veins arcuate, mostly 2–4-forked, impressed above, elevated beneath, here bearing a few very minute, laxly substellate scales; sori slightly supramedial, uniserial, 6–8 on the proximal side, 10–15 on the distal, abraded in the specimens at hand.

Type in herb. Univ. Bot. Mus. Copenhagen, collected in mossy forest of Loma La Vieja, Constanza, Prov. de la Vega, Dominican Republic, alt. 2,000 meters, Nov. 7, 1929, by E. L. Ekman (no. H. 14058). A frond from this specimen is in the U. S. National Herbarium (no. 1,555,593).

Most closely related to *P. Underwoodii* Maxon, of Jamaica, which grows at about the same altitude and has the fronds similarly non-cirrhate and invariably proliferous. That species differs consistently, however, in its subentire pinnae and in leaf-shape, the blades being narrowly elongate-triangular, the attenuate apical portion consisting of numerous, gradually reduced, oblique pinnae, which are decurrent, the uppermost broadly confluent.

Polystichum Ekmani is represented also by *Ekman* H. 12791, from the Monción region, Prov. Monte Cristi, Dominican Republic, alt. 1,900 meters. One frond of this collection bears at its tip a plant 3 cm. high.

PROCEEDINGS
OF THE
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DESCRIPTIONS OF TWO RACES OF *PEROGNATHUS*
AMPLUS FROM ARIZONA.

BY SETH B. BENSON,

Museum of Vertebrate Zoology, University of California, Berkeley, California.

Among the mammals collected during the summer and autumn of 1932 by Miss Annie M. Alexander and Miss Louise Kellogg in the southwestern United States, and given to the Museum of Vertebrate Zoology of the University of California, are specimens representing two undescribed races of *Perognathus amplus*. One series obtained on the black sand in the vicinity of the Wupatki Ruins of the Wupatki National Monument in northern Arizona represents a race having the highest degree of dark pigmentation yet known in the subgenus *Perognathus*. Another series from near the Little Colorado River at Cameron, Arizona, is distinct from the Wupatki series and also from other described races of *Perognathus amplus*.

Perognathus amplus cineris, new subspecies.

Type.—Male, adult, skin and skull, no. 55771, Mus. Vert. Zool.; from near the Wupatki Ruins, Wupatki National Monument (about 27 miles northeast of Flagstaff), Coconino County, Arizona; collected October 12, 1932, by Annie M. Alexander; original number 1932.

Distribution.—Known only from ground covered with black sand (volcanic cinders) in the vicinity of the Wupatki Ruins, but possibly also occurring in similar places elsewhere in the San Francisco Mountain volcanic field.

Diagnostic characters and comparisons.—A race of *Perognathus amplus* characterized by small size, nearly black dorsal coloration, and dark ventral coloration. Compared with *P. a. amplus* Osgood and *P. a. pergracilis* Goldman: distinctly smaller (see measurements); dorsal coloration prevailingly blackish rather than yellowish, subterminal bands much narrower and less richly colored, belly hairs heavily pigmented rather than lightly pigmented or unpigmented, ears much more heavily pigmented, tail less

distinctly bicolor; skull smaller, more highly arched, mastoid and tympanic bullae less inflated, mastoid bullae projecting less posteriorly to plane of occiput. Much darker and smaller than *P. a. rotundus* Goldman. Darker than *P. a. taylori* Goldman. Most like *P. a. ammodytes* (description below) except in color.

Color (terms after Ridgway, Color Standards and Color Nomenclature, 1912).—Dorsal hairs with apical portions black, subterminal bands pale ochraceous-salmon, basal portions plumbeous. Breast and throat white. Hairs of belly plumbeous basally, tipped with light ochraceous-buff. Tail indistinctly bicolor. Hairs on dorsal side of tail black; on ventral side, black, or pale ochraceous-buff tipped with black, the black hairs most numerous terminally. Hairs of hind feet mixed white or pale ochraceous-buff, the latter predominating. Skin of ears black-pigmented. A stripe of black hairs extends from tip of nose to base of vibrissae. Most noteworthy characters of color are: abundance of black pigment and small amount of yellow pigment in dorsal hairs; narrow subterminal bands; heavy pigmentation of belly hairs and of skin of ears; black stripe from nose to base of vibrissae; nearly unicolor dark tail.

Specimens examined.—Total number, 14, all from the vicinity of the Wupatki Ruins.

Remarks.—This dark race was found to be closely restricted to ground covered with black sand. The specimens were secured at several places between 2.6 miles west of the ruins and along the road between the ruins and Heiser Spring.

***Perognathus amplus ammodytes*, new subspecies.**

Type.—Male, adult, skin and skull, no. 55774, Mus. Vert. Zool.; from 2 miles south of Cameron, Coconino County, Arizona; collected August 8, 1932, by Louise Kellogg; original number 1620.

Distribution.—Known only from near the type locality.

Diagnostic characters and comparisons.—A race of *Perognathus amplus* characterized by small size, dark dorsal color, and pigmented belly hairs. Compared with *P. a. cineris*: general coloration prevailingly yellowish rather than blackish, subterminal bands of hairs of dorsal surface broader, belly hairs tipped with white and less heavily pigmented, tail more distinctly bicolor, all hairs on hind feet white rather than some yellowish and some white, lacks dark stripe between tip of nose and base of vibrissae; size slightly greater; skull averages slightly larger, relatively narrower. Compared with *P. a. amplus* and *P. a. pergracilis*: general coloration darker, belly hairs always pigmented, never white; smaller in body size and in skull; mastoid bullae less inflated posteriorly, not projecting as far past plane of occiput.

Color.—Dorsal hairs with tips black, wide subterminal bands light ochraceous-buff, basal portions plumbeous. Hairs of breast and throat white. Hairs of belly with French gray bases, subterminal bands of pinkish buff, and white tips. Narrow stripe of black hairs on dorsal side of tail, rest of tail hairs pinkish buff. Hairs of hind feet white. Skin of ears dark-pigmented. A spot of black hairs on nose and at base of vibrissae.

Specimens examined.—Total number, 7, all from the vicinity of Cameron, Coconino County, Arizona, as follows: east bank of Little Colorado River at Tuba City road bridge (opposite Cameron), 3; 2 miles south of Cameron, 3; 3 miles south of Cameron, 1.

Remarks.—Pocket mice of the *amplus* group apparently are usually not numerous near Cameron. Three specimens were obtained by F. B. Sumner and H. S. Swarth in 1922 on the east bank of the Little Colorado opposite Cameron. In 1931 I spent 3 days (630 trap nights) at the same place in an attempt to secure additional specimens, but was not successful. In 1932 Miss Alexander and Miss Kellogg obtained 4 specimens south of Cameron on the west side of the river in sandy ground where the chief vegetation was bunch grass and saltbush.

Two other species of *Perognathus* have their darkest races on the lava and cinder beds of the San Francisco Mountain volcanic field. These are *P. flavus fuliginosus* Merriam and *P. apache cleomophila* Goldman. The parallelism in color in these species is probably the result of the same cause, which I believe to be natural selection for concealing coloration.

Perognathus amplus is a species clearly distinct from *P. flavus* and *P. apache*. The two races of *amplus* here described are easily distinguishable in the field from the dark races of *flavus* and *apache* by having actually and relatively longer, more penicillate tails. They show some approach in small size and long tails to the species *P. longimembris* which is represented north of the Grand Canyon by the race *P. l. arizonensis* Goldman, but the differences in size and in skull characters are too great to indicate conspecificity.

MEASUREMENTS IN MILLIMETERS AND GRAMS OF ADULT MALES OF *Perognathus amplus ammodytes*, *Perognathus amplus cineris*,
Perognathus amplus amplus (TOPOTYPE), *Perognathus amplus pergracilis* (FROM DETRITAL VALLEY, ARIZONA).

	Total length	Body Measurements			Head and body		Weight	Skull Measurements				
		Tail	Hind foot	ammodytes	Occipito-nasal	Fronto-nasal		Breadth across mastoids above spur of squamosals	Greatest length of mastoid	Distance between stylomastoid foramina	Least interorbital breadth	
No. Specimens.....	3	3	4	4	3	3	1	4	1	4	1	4
Mean.....	145.7	79.7	20.8	64.8	23.3	16.0	12.8	8.8	11.2	5.5		
Minimum.....	143	76	20	61	22.9	15.7		8.5		5.3		
Maximum.....	150	83	21	67	23.8	16.3		10.0		8.9		
<i>cineris</i>												
No. specimens.....	7	7	7	7	7	7	7	7	7	7	7	7
Mean.....	141.9	77.1	19.9	64.8	22.6	15.4	12.7	8.6	11.3	5.5		
Minimum.....	138	75	19	62	22.2	15.1	12.5	8.4	11.0	5.3		
Maximum.....	148	82	21	66	23.2	15.8	12.9	8.9	11.4	5.6		
<i>amplus</i>												
No. specimens.....	1	1	1	1	1	1	1	1	1	1	1	1
Mean.....	156	82	21	74	24.3	16.1	13.1	9.1	11.8	5.4		
<i>pergracilis</i>												
No. specimens.....	18	18	18	18	18	18	18	18	17	18		
Mean.....	158.3	86.0	20.9	72.3	23.8	16.1	13.4	8.9	11.8	5.6		
Minimum.....	147	77	20	69	22.7	15.4	12.8	8.7	11.3	5.3		
Maximum.....	167	94	22	80	24.7	16.8	14.1	9.5	12.3	6.1		

PROCEEDINGS
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THE RACES OF THE TINAMOU *CRYPTURELLUS*
CINNAMOMEUS.

BY H. B. CONOVER.

Having always been greatly interested in the tinamou, recently on receipt of a series of *Crypturellus cinnamomeus* from Honduras, I undertook a study of all the races of this species. It was surprising to discover that there was little material in this country from north of Honduras and Salvador; therefore, not much could be done with the races found in Mexico, except for *C. c. goldmani* from Yucatan. From south of Guatemala, specimens were much more numerous and the races could be worked out more satisfactorily.

Two forms from northern South America, *Crypturus idoneus* (Todd) and *Crypturellus cinnamomeus spencei* (Brabourne and Chubb) have been called races of *cinnamomeus*. While they may eventually be proven to be such, the evidence is not yet conclusive; and since the gap in distribution is considerable, I have omitted them for the present.

For the loan of material I am indebted to Mr. James L. Peters of the Museum of Comparative Zoology; to Mr. J. T. Zimmer of the American Museum of Natural History; to Dr. Herbert Friedmann of the U. S. National Museum; to Mr. A. J. Van Rossem of the California Institute of Technology, and to Mr. Rudyerd Boulton of Field Museum.

Crypturellus cinnamomeus cinnamomeus (Lesson).

Tinamus (Nothura) cinnamomeus Lesson, Rev. Zool. 1842, p. 210 (La Union, Central America = Salvador).

Specimens examined.—Salvador: 7♂ 3♀ from Lake Olomega, Mt. Cocaguatique, Volcan San Miguel, Rio San Miguel, Dept. San Miguel; Olomega, Volcan Conchagua, Dept. La Union; and Colima, Dept. Cuscatlan. Mexico: 1 ♀ Santa Efigenia, Tehuantepec.

This seems to be the smallest of the races, the wings of Salvador males averaging 156.5 and females 160.5 mm. The single female from Tehuantepec, however, has a wing of 174 mm. In coloration this form is very reddish on the breast and dark brownish on the back.

Peters (Birds of the World, Vol. 1) gives the range of this race as "southern Vera Cruz and Oaxaca south on Pacific slope to Nicaragua." He evidently considers *C. c. sallaei* from Cordoba, Vera Cruz, and *C. c. dellatritii* from Nicaragua as synonyms. I am inclined to doubt this and would state the range of the typical race as the Pacific lowlands from the Gulf of Fonseca to the Isthmus of Tehuantepec.

Crypturellus cinnamomeus mexicanus (Salvadori).

Crypturus mexicanus Salvadori, Cat. Birds Brit. Mus. 27, 1895, p. 516, (in key) p. 545 (Monte Verde, Tamaulipas, Mexico).

No specimens of this race seem to be available in the United States, so no comparison could be made.

Salvadori in comparing it to *C. cinnamomeus* says it is less rufous on the occiput and nape, and the female is not barred with black on the lower foreneck and sides of the breast. The range is given as northeastern Mexico.

Crypturellus cinnamomeus occidentalis (Salvadori).

Crypturus occidentalis Salvadori, Cat. Birds Brit. Mus. 27, 1895, p. 516, (in key) p. 546 (San Blas, Nayarit, Mexico).

No specimens have been available.

According to Salvadori, in the males the occiput and sides of the head are not rufescent but olive brown, and the lower foreneck and breast are grayish, with no reddish tinge. The only range given is Tepic.

Crypturellus cinnamomeus sallaei (Bonaparte).

Nothocercus sallaei Bonaparte, Compt. Rend., 42, p. 881, n. 333, p. 954, n. 9. (1856) (Cordoba, Vera Cruz, Mexico).

One specimen has been examined from near the type locality. This is a bird taken at Omealea (or Omgalea) near Cordova. It is an old specimen which seems to have been mounted at some time. The label calls it a female, but as the forehead and the fore part of the crown are unbarred black, I take it really to be a male. The wing measures 169 mm. In coloration it is much lighter (brownier, less blackish) on the upper parts than either males or females from Salvador. Basing an opinion on one specimen of course is hazardous, but considering the difference in climate between the north and south sides of the Isthmus of Tehuantepec, it seems that when more material is available, the name *sallaei* may be reinstated.

Crypturellus cinnamomeus inornatus (Nelson).

Crypturus inornatus Nelson, Auk, 17, 1900, p. 253 (Metlaltoyuca, Puebla, Mexico).

Specimens examined.—Mexico: 1 ♀ Metlatoyuca, Puebla; 1 ♂, 2 ♀ Orizaba, 1 ♂, 1 ♀ Jalapa, 1 ♂ Buena Vista, 1 ♂ Pasa Nueva, 1 ♂ Mirador (near Vera Cruz), Vera Cruz.

There is great doubt in my mind as to what race or races the specimens listed above represent. Certainly the female from Metlatoyuca is a very much browner bird on the upper parts than all the rest. It may be that the others really represent *sallaei*, or even *mexicanus*, or both. The individual variation is so great, however, that it seems impossible to classify them without fresh material from near the type localities. It may be that *inornatus* will prove to be simply a synonym of *sallaei*.

Crypturellus cinnamomeus goldmani (Nelson).

Crypturus sallaei goldmani Nelson, Proc. Biol. Soc. Wash., 14, 1901, p. 169 (Chichen Itza, Yucatan).

Specimens examined.—Mexico: 2 ♀ Chichen Itza, 2 ♂ Temax, 3 ♀, 3 ♂ Yucatan. Guatemala: 2 ♀ Uxactun, Peten.

The females of *goldmani* are distinguished from all other races by the sharp contrast between the dark reddish chest and upper breast and the very light buffy white lower breast and belly. Compared to typical *cinnamomeus* the upper parts and the chest in both sexes are lighter, less reddish. Wings of females from Yucatan average 161.8; males 164.4 mm.

Range.—Throughout the Yucatan Peninsula and northern Guatemala.

*Crypturellus cinnamomeus vicini*or, subsp. nov.

Type from La Flor, near Archaga (about half way between Tegucigalpa and Comayagua), Dept. Tegucigalpa, Honduras. No. 10368, adult male in the Conover Collection, Field Museum of Natural History, Chicago. Collected June 14, 1932, by C. F. Underwood.

Characters.—Differs from *C. c. cinnamomeus* on the upper parts by being lighter, more brownish, less reddish. This is especially noticeable on the nape, back of the neck, and mantle. The light barring on the tail, rump, and upper wing coverts is whiter and broader. On the under side the chest, upper breast, and sides are lighter, more ochraceous, much less reddish, while the lower foreneck is lighter gray. It is also considerably larger, females averaging 171.2, males 167 mm.

Differs from *C. c. dellatirii* on the under side by being lighter, more ochraceous, less reddish (*dellatirii* in the reddish color of its breast is about midway between *vicini*or and *cinnamomeus*). On the upper side the females are much lighter brownish, less reddish, but in the males this difference is less pronounced. In both sexes, however, the barring of the upper wing coverts is heavier and whiter, therefore much more pronounced.

Differs from *C. c. praepes* by having the upper parts lighter, more grayish, less brownish, and by having the barring of the upper wing coverts whiter and more pronounced. On the under side it is slightly lighter on the chest, and the gray of the foreneck and upper chest is lighter and much less extensive. The female of *vicini*or differs radically from the female of *praepes*

in having only a slight, inconspicuous barring on the foreneck and chest. In *praepes* there is heavy barring in all eight examples before me.

Differs from *C. c. goldmani* by being lighter, less reddish on the chest and upper breast, and in the females by being darker, more ochraceous on the lower breast and belly. On the upper parts the females are much less reddish on the nape and back of the neck, while the males are slightly lighter on the back. It is also somewhat larger than *goldmani*.

Description.—Forehead and crown black. Nape and back of the neck rufescent, indistinctly barred with black. Mantle, upper back and scapulars grayish brown with an olive tinge and very finely vermiculated with blackish. Lower back and upper tail coverts grayish brown barred with black, the bars becoming wider on the tail coverts. Tail black, barred with buff, and tipped with buffy white. Primaries and secondaries dark brown, the latter barred on the outer web with buffy white, these bars becoming obsolete on the outermost ones. Primary and secondary coverts dark brown, barred widely with buffy white. Outer wing coverts dark brown, inner ones grayish with light buff tips. Sides of the head and neck ochraceous, the latter with a rufous tinge. Throat white, foreneck light gray, chest and breast ochraceous buff, with a grayish tinge on the upper chest. Abdomen buff. Flanks dark brown barred with buff. Under tail coverts dark brown at base, the terminal third ochraceous buff, sparsely splotched with dark brown, and almost white at the tip. Wing 170, tarsus 46, culmen 25, middle toe (with claw) 33 mm.

Specimens examined.—Honduras: 17 ♂, 3 ♀ Hatillo, 6 ♂, 2 ♀ La Flor, 1 ♂ Monte Redondo, 1 ♂ Cerro Cantoral, Dept. Tegucigalpa. Mexico: 1 ♂, 1 ♀ Canjob, Chiapas.

The females of this new race differ markedly from the females of the neighboring races, *cinnamomeus*, *goldmani*, *dellatirii*, and *praepes*. The males, although differing markedly from males of *cinnamomeus*, closely approach specimens of the same sex in the other three, especially *goldmani*.

The two specimens from Chiapas agree perfectly with the series from Honduras.

Range.—Western highlands of Honduras, and probably those of Guatemala and Chiapas.

Crypturellus cinnamomeus dellatirii, Bonaparte.

Tinamus dellatirii Bonaparte, Compt. Rend., 38, p. 663, 1854 (Nicaragua).

Specimens examined.—Nicaragua: 10 ♂, 5 ♀ from Volcan de Chinandega, San Geronimo, Volcan Viego, Tepitapa, Leon, and Muy Muy.

The females of this race are only slightly lighter on the underparts than those of typical *cinnamomeus*, and on the upper parts there is no difference. In *cinnamomeus*, however, the females are distinctly barred on the lower neck and upper chest, while in *dellatirii* barring is absent or very indistinct. In the males, the Nicaraguan birds are much lighter, more brownish on the upper parts and less reddish on the chest and upper breast. In size this form is much larger, equalling *praepes* in this respect. The average of the wings of females is 168.8 and of males 165.9 mm.

Range.—Probably confined to northwestern Nicaragua.

Crypturellus cinnamomeus praepes (Bangs & Peters).

Crypturornis cinnamomeus praepes, Bangs & Peters, Bull. Mus. Comp. Zool., 67, No. 15, 1927, p. 472 (Bolson, Costa Rica).

Specimens examined.—Costa Rica: 4 ♂, 8 ♀ from Las Canas, Bebedero, Huma, Paquera and Ballina.

This seems to be the largest of the races. The eight females have wings averaging 167.5 mm. and the four males average 171.75 mm. In coloration the females are paler and browner on the upper parts than typical *cinnamomeus*, and on the under side are much less reddish on the chest and lighter, more buffy on the lower breast and belly. They are also much more heavily barred on the lower neck and chest than in any other race. The males are lighter brown, less reddish on the upper parts, and on the under sides are paler, more buffy.

Range.—Northwestern Costa Rica.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW BOX TURTLE FROM
MEXICO.

BY LEONHARD STEJNEGER,
U. S. National Museum.

The following description has been held back for many years in the hope of obtaining additional material. However, box turtles appear to be so rare in Mexico that it is deemed advisable to make the present one known now, although based on a single specimen only.

***Terrapene goldmani*, new species.**

Diagnosis.—Nostrils oval, very close together; hind feet with three toes, clawed; three phalanges in middle digit of fore foot; digits scarcely webbed; no bony zygomatic arch; upper jaw hooked, not notched; first marginal much shorter than width of first central at middle; length of first central equals width of third central; fourth central longer than wide, as long as first; interhumeral seam more than two-thirds the length of interpectoral seam; color above and below nearly uniform "clay-color" with well defined broad dark-brown margins to each lamina along the seams.

Type.—U. S. National Museum, No. 46251; ad. fem.

Type locality.—Chijol (or Chijoles), southeastern corner of the State of San Luis Potosi, Mexico; in the coast plain.

Collectors.—E. W. Nelson and E. A. Goldman, May 11, 1898.

DIMENSIONS IN *mm.*

Length of carapace (straight line).....	151
Width of carapace (at 7th marginal).....	110
Length of plastron (straight).....	144
Width of plastron (at middle of femorals).....	88
Anterior plastral lobe.....	61
Posterior plastral lobe.....	87
Height of body (at 2-3 centrals).....	75
Length of first marginal.....	18
Length of first central.....	36
Width of first central at middle.....	33

Width of third central.....	36
Length of fourth central.....	36
Width of fourth central.....	32
Interhumeral seam.....	17
Interpectoral seam.....	23
Eye to nostril.....	6.5
Diameter of orbit.....	9.5
Width of head.....	22

Named in honor of Major E. A. Goldman of the U. S. Biological Survey in recognition of his splendid work in the exploration of the Mexican fauna.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

GEOGRAPHIC VARIATION IN THE YELLOW-BILLED
SHRIKE, *CORVINELLA CORVINA*.

BY HERBERT FRIEDMANN¹ AND W. WEDGWOOD BOWEN.

In 1900 (Journ. f. Ornith., p. 263) Neumann described a western race of this bird as *Corvinella corvina togoensis*, using as his comparative material birds from Senegambia and Kavirondo. The latter he assumed to be true *C. c. affinis* Hartlaub, the type locality of which is Nubia. Neumann apparently had no topotypical *affinis*, which is not surprising as the species is not known from Nubia proper. Heuglin (Sitzungs. Kais. Akad. Wissensch. Wien., **19**, 1856, 286), whose first use of the name *affinis* was validated by Hartlaub the next year, merely says that the bird is abundant on the Bahr el Abiad (White Nile) south of 7° N. Latitude.

Before discussing the variations of this shrike in the eastern part of its range, mention may be made of the name *C. c. nubiae* Filippi. This name, referred to by several authors, we have been unable to trace, all references found being erroneous. If found, it may have to replace *affinis*. Recent study of material from Kavirondo, Uganda, northeastern Uelle district, Belgian Congo, and the Sudan (Bahr el Ghazal, Mongalla, and southern Darfur provinces) shows that the Kavirondo birds are not *affinis*, but belong to a distinct, unnamed race. Furthermore, the birds of the southern Bahr el Ghazal are again distinct. These may be described as follows:

***Corvinella corvina chapini*, subsp. nov.**

Type.—Acad. Nat. Sci. Phila., no. 97846, adult female, collected at Kibigori, Kavirondo, August 21, 1918, by A. Blayney Percival.

Subspecific characters.—Similar to *C. c. affinis* from Bahr el Jebel and southern Darfur, but slightly darker and more heavily streaked above and below, and with the rufescent area in the primaries more restricted basally (distance from distal end of rufescent area to tip of fourth primary averaging 50.8 mm. in a series of *chapini* from Kavirondo as against 43 mm., in a series of *C. c. affinis*).

¹Published by permission of the Secretary of the Smithsonian Institution.

Distribution. Kavirondo and Elgon district through Uganda (Rhino Camp) to the northeastern Belgian Congo (Vankerckhovenville and Garamba).

We take pleasure in naming this race in honor of Dr. James P. Chapin of the American Museum of Natural History.

***Corvinella corvina caliginosa*, subsp. nov.**

Type.—Acad. Nat. Sci. Phila., no. 104553, adult male, collected at Rangu, southern Bahr el Ghazal, April 16, 1931, by Dr. H. Woodman.

Subspecific characters.—The grayest of all the races and the most heavily streaked above and below; in the character of the rufescent wing area intermediate between *affinis* and *chapini* (the distance from distal end of rufescent area to tip of fourth primary averaging 47.5 mm.); tail very long (188.5–191 mm., as against 174–175 mm. in *affinis* and 175–177 mm. in *chapini* (one specimen from Garamba approaching *caliginosa*, with a tail of 187.5 mm.).

Distribution.—Known only from the Yambio district, southern Bahr el Ghazal.

The races of this species, then, are as follows:

1. *Corvinella c. corvina* Shaw.

Senegal and Gambia east to Hausaland, northern N. Nigeria.

Material examined.—Senegal, 2 (U. S. Nat. Mus.); 1 (Amer. Mus. Nat. Hist.); Gambia, 1 (Acad. Nat. Sci. Phila.); "W. Africa," 1 (Acad. Nat. Sci. Phila.).

2. *Corvinella c. togoensis* Neumann.

Portuguese Guinea to the Bansa Mts., Cameroon, and to N. Nigeria. Selater (Syst. Av. Aethiop., pt. 2, 1930, p. 615) considers this form to be doubtfully distinct from typical *corvina*. The single specimen seen by us is insufficient to enable us to express an opinion.

Material examined.—Kati, French Sudan, 1 (Amer. Mus. Nat. Hist.).

3. *Corvinella c. affinis* Hartlaub.

Upper Nile district through northern Bahr el Ghazal to central Kordofan and Darfur.

Material examined.—Logos, Bahr el Jebel, 1 (U. S. Nat. Mus.); southern Darfur, 3 (Acad. Nat. Sci. Phila.).

4. *Corvinella c. chapini*.

Range as stated above.

Material examined.—Kavirondo, 6 (Acad. Nat. Sci. Phila.); Uganda, 2 (U. S. Nat. Mus.); northeastern Belgian Congo, 12 (Amer. Mus. Nat. Hist.).

5. *Corvinella c. caliginosa*.

Range as stated above.

Material examined.—Southern Bahr el Ghazal, 3 (Acad. Nat. Sci. Phila.).

We are much indebted to the officials of the American Museum of Natural History and the Academy of Natural Sciences of Philadelphia for the loan of specimens.

PROCEEDINGS
OF THE
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REMARKS ON THE GENUS *LIMNODROMUS* WIED.

BY PIERCE BRODKORB.

Some eighty years ago Bell¹ and Lawrence² separated the dowitcher of western North America from the eastern bird, now known as *Limnodromus griseus griseus* (Gmelin). Up to the present time *Limosa scolopacea* Say has been thought to be the earliest name for this western bird. Comparison of Say's description with specimens, however, shows that his name is a synonym of Gmelin's *griseus*. I quote the distinctive passages, omitting those which might apply to either form:³

"... cheeks, chin, throat, and origin of the breast cinereous; ... tail coverts and tail white fasciate with black, ... breast and belly white; sides spotted and undulated with blackish cinereous; inferior tail coverts with black abbreviated bands, the white prevailing . . ."

In this description no mention is made of the prominent bars on the throat and upper breast of the Alaskan bird, while *griseus* often has these parts almost immaculate. The tail and its coverts are said to be black and white as in *griseus*, instead of the black and deep cinnamonaceous of the Alaskan bird. The sides are spoken of as spotted and undulated, which is exactly the case in *griseus*, but not so in the Alaskan bird. *Griseus*, too, often has the lower breast and belly white in spring, while the Alaskan bird seldom does.

Say gives the bill length as $2\frac{3}{4}$ inches, a measurement about one millimeter longer than any I have obtained for *griseus*. This small discrepancy may be accounted for by a different method of measuring the bill, or perhaps the measurement was inaccurately taken.

It is evident that Say was unacquainted with *Scolopax grisea* Gmelin, for he was so struck by the characters of his bird that he proposed to erect a new genus for it.

When these facts are considered, together with the apparent scarcity of the Alaskan form in Iowa, whence came Say's type, it seems clear that the

¹Bell, Ann. Lyc. Nat. Hist. N. Y., V, 1852, 1.

²Lawrence, *ibid.*, 4.

³Say, in Long's Exped. Rocky Mts., I, 1823, 170.

bird Say described was a spring example of *Limnodromus griseus griseus* of the extreme type in which the breast is almost without markings.

Scolopax longirostris Bell is merely a new name for *Limosa scolopacea* Say and must therefore also apply to *Limnodromus griseus griseus*. The form of dowitcher breeding in Alaska is thus left without a valid name. It may be known as

***Limnodromus griseus fasciatus*, subsp. nov.**

Type.—Female adult, "shot by nest," no. 3693, collection of H. B. Conover; Hooper Bay, Bering Sea, Alaska; June 9, 1924; H. B. Conover, original no. 879.

Wing (flat), 149 mm.; tail, 57 mm.; culmen, 74.5 mm.; tarsus, 40 mm.; middle toe with claw, 31.2 mm.

Characters.—Similar to *Limnodromus griseus griseus*, but wing averaging slightly shorter; culmen, tarsus, and middle toe averaging longer.

Summer adults with throat and usually chin flecked with dusky, the marks becoming extended posteriorly to form well-defined transverse bars on upper breast; sides of breast and usually under tail-coverts barred with black; general color of lower parts, including under tail-coverts, vinaceous cinnamon,⁴ the white tips of the feathers larger in the same stage of wear; light bars of central rectrices and upper tail-coverts oftener cinnamonaceous, usually orange-cinnamon; cinnamonaceous markings of tertials, scapulars, and interscapulars deeper, often orange-cinnamon.

Winter adults with throat and breast brokenly barred with darker; under tail-coverts and sides of breast usually barred.

Juvenals with ochraceous below usually duller; cinnamonaceous markings of upper parts deeper, between vinaceous-tawny and orange-cinnamon; under tail-coverts often barred.

Remarks.—Of this race 65 specimens have been examined from the following localities:

Alaska: Hooper Bay, 4; Izembek Bay (Moffet Cove), 1; Kashunuk River, 30 miles from coast, 1; Nome, 3.

Alberta: Beaverhills Lake, 4.

Bahama Islands: Inagua (Mathews Town), 2.

British Columbia: Chilliwack, 2; Sumas Lake, 2.

California: Kern County (Buena Vista Lake), 1; Los Angeles County (Playa del Rey), 1; Monterey County (Monterey), 2; Orange County (Anaheim Landing), 1; Ventura County (Point Mague), 1.

Costa Rica: Guanacaste (Punta Piedra), 1.

Florida: Amelia Island, 1; Banana Creek, 1; Cape Sable, 1; Indian River, 2; Kissimmee Lake, 2.

Georgia: McIntosh County, 1.

Illinois: Marshall County (Swan Lake), 1.

Iowa: Hancock County (Britt), 1.

Louisiana: Cameron Parish, 2.

Lower California: San José del Cabo, 2.

⁴Colors compared with Ridgway, Color Standards and Color Nomenclature, 1912.

Nebraska: Lincoln, 1.

New Mexico: Dona Ana County (San Miguel), 3.

New York: Suffolk County (Good Ground), 1.

Saskatchewan: Moose Jaw District (Lake Johnston), 5.

South Dakota: Vermilion, 1.

Texas: Brownsville, 3; Indianola, 2; Mesquit Bay, 1; Seadrift, 1; Tivoli, 1.

Utah: Ogden, 1.

Washington: Pierce County (Puyallup), 2.

Wisconsin: not further specified, 1.

Locality not specified, 2.

Prof. William Rowan has lately treated this bird as a distinct species.⁵ Contrary to his statement, however, intermediates between *fasciatus* and *griseus* are by no means rare. Over twenty individuals of the series examined in the present connection are not typical of either race. Some few, in fact, are so intermediate that it is very difficult to say to which form they are closer. Not having seen breeding birds from Yukon and Mackenzie, I am unable to state just where the area of intergradation is. Six spring intermediates from Kuiu Island, southeastern Alaska, however, give weight to the supposition that the Mackenzie Valley is the meeting-ground of the two races.

Limnodromus griseus griseus (Gmelin).

[*Scolopax*] *grisea* Gmelin, Syst. Nat., I, pt. ii, April 20, 1789, 658 ("in *Noveboraci maritimis*").

[*Scolopax*] *noveboracensis* Gmelin, Syst. Nat., I, pt. ii, April 20, 1789, 658 ("in *Noveboraci maritimis*").

[*Scolopax*] *nutans* Gmelin, Syst. Nat., I, pt. ii, April 20, 1789, 659 ("in littore Labrador").

[*Scolopax*] *cayennensis* Gmelin, Syst. Nat., I, pt. ii, April 20, 1789, 661 ("in Cayenna").

[*Tringa*] *noveboracensis* Gmelin, Syst. Nat., I, pt. ii, April 20, 1789, 673 ("in Noveboraco").

Scolopax leucophæa (nec Latham) Vieillot, Nouv. Dict. d'Hist. Nat., III, 1816, 358.

Totanus ferrugineicollis Vieillot, Nouv. Dict. d'Hist. Nat., VI, 1816, 401 (new name for *Scolopax noveboracensis* Gmelin).

Scolopax paykullii Nilsson, Orn. Sueica, II, 1821, 106, pl. 11.

Limosa scolopacea Say, in Long's Exped. Rocky Mts., I, 1823, 170 ("near the Bowyer creek" = near Council Bluffs, Iowa).

Macrorhamphus punctatus Lesson, Traité d'Orn., 1831, 556 (New York).

Scolopax longirostris Bell, Ann. Lyc. Nat. Hist. N. Y., V, 1852, 3 (new name for *Limosa scolopacea* Say).

L[imnodromus] griseus hendersoni Rowan, Auk, XLIX, no. 1, January 4, 1932, 22 ("Devil's Lake, Alta.").

Characters.—Similar to *Limnodromus griseus fasciatus*, but wing averaging slightly longer; culmen, tarsus, and middle toe averaging shorter.

⁵Rowan, Auk, XLIX, no. 1, Jan. 4, 1932, 14.

Summer adults with chin and throat usually immaculate; breast pinkish cinnamon spotted with black (sometimes almost immaculate), the white tips of the feathers narrower, the cinnamonaceous sometimes extending to abdomen and under tail-coverts, but these often white; under tail-coverts and sides of breast spotted, the flanks alone being barred, the bars usually less well-defined; light portion of central rectrices and upper tail-coverts often white, never deeper cinnamonaceous than pinkish cinnamon or vinaceous-cinnamon; light edgings of scapulars and tertials also paler, cinnamon-buff to vinaceous-cinnamon.

Winter adults with lower neck and breast usually (?) streaked with darker; sides of breast spotted or irregularly vermiculated; under tail-coverts usually spotted.

Juvenals with ochraceous below usually brighter; light edgings of tertials and scapulars paler, clay color or cinnamon-buff; under tail-coverts usually spotted.

Remarks.—Of this race 121 specimens have been examined from the following localities:

Alaska: Kuiu Island (Three-mile Arm, migrants), 6.

Alberta: Beaverhills Lake, 3; Edmonton (7 miles west), 2; Fawcett, 5; Fort Assiniboine, 2; La Saline, 2.

Bahama Islands: Andros, 1.

Brazil: Maranhão (Magunça Island), 2.

British Columbia: Sumas Lake, 2.

California: Contra Costa County (El Cerrito), 2; Humboldt County (Eureka), 1; Los Angeles County (Playa del Rey), 1; Santa Barbara County (near Goleta), 3; Ventura County (Point Mague), 1.

Costa Rica: Guanacaste (Punta Piedra), 9.

Florida: Amelia Island, 1; Banana River, 1; Caximbas, 1; Pilot Town, 1.

Georgia: McIntosh County, 3.

Illinois: Cook County (Hyde Lake), 9; Illinois River, 1; Lake County (Beach, 2; Deerfield, 1).

Indiana: Lake County (Miller), 1.

Iowa: Burlington, 1; Marshalltown, 1; Swan Lake, Johnson County, 2.

Lower California: San José del Cabo, 4.

Massachusetts: Barnstable County (Chatham, 1; East Orleans, 10; Great Island, 2; Monomoy Island, 1); Plymouth County (Marshfield), 1.

Minnesota: Lac qui Parle County, 1.

New Jersey: Barnegat Inlet, 1.

New York: Cayuga Lake, 1; Good Ground, 1; Long Beach, 1; South Oyster Bay, 1.

Rhode Island: Middletown, 1; Perme, 1.

Saskatchewan: Osler, 1.

South Carolina: Charleston, 2; Copahee Sound, 6; Frogmore, 3; Sullivan's Island, 2.

South Dakota: Vermilion, 1.

Texas: Brownsville, 1; Corpus Christi, 2; Nueces, 2.

Virginia: Cobbs Island, 3.

Wyoming: near Cheyenne, 1.

Locality not specified, 2.

I can find nothing to substantiate the recently described *Limnodromus griseus hendersoni* Rowan. There is every possible variation between the characters attributed to this bird and "typical" *griseus*. Breeding birds from Alberta differ so much among themselves that it is impossible to distinguish them, either by color or by size, from Atlantic coast birds. The white belly appears to be a character of one-year old birds or those not in full plumage and would seem to be of no geographical significance. It is, moreover, in the light of all past evidence, very unlikely that any form of dowitcher breeds regularly east of Hudson Bay, a condition which leaves true *griseus* (so-called) without a breeding range. *Limnodromus griseus hendersoni* Rowan thus becomes a synonym of *Limnodromus griseus griseus* (Gmelin).

From the specimens listed above it will be seen that this race is quite common on migration along the California coast.

***Limnodromus semipalmatus* (Blyth).**

Macrorhamphus semipalmatus "Jerdon," MS., Blyth, Journ. Asiat. Soc. Bengal, new ser., XVII, pt. i, no. 15, March, 1848, 252 ("Calcutta bazar").

Micropalama tacksanowskia Verreaux, Rev. et Mag. de Zool., 2nd ser., XII, May, 1860, 206, pl. 14 ("la Daourie").

Remarks.—Of this species five specimens have been examined from the following localities:

China: Chihli (Peitaiho), 2.

Siam: Bang Hia, 3.

If *semipalmatus* is excluded from *Limnodromus* and placed in *Pseudoscolopax* Blyth, as has recently been done,⁶ we have two monotypic genera instead of one genus containing two species. The only structural character by which the two "genera" may be separated is the web between the inner and middle toes of *semipalmatus*, which is absent in *griseus*. In juvenal and winter plumages the two birds are very similar. For these reasons it seems best to consider the web of *semipalmatus* as a good specific character, rather than of generic value.

For the loan of material used in the present connection I am indebted to Mr. H. B. Conover and Mr. John E. Thayer, and to the authorities of Coe College, Field Museum of Natural History, the Museum of Comparative Zoology, the Museum of Vertebrate Zoology, the University of Illinois, and the University of Iowa. My thanks are also due Dr. Witmer Stone and Mr. J. T. Zimmer, who gave information about the nomenclatural status of *Scolopax longirostris* Bell.

⁶Ridgway, Bull. U. S. Nat. Mus., no. 50, pt. viii, 1919, 146, note.

TABLE OF MEASUREMENTS
(in millimeters).

WING			TAIL			CULMEN			TARSUS			MIDDLE TOE, WITH CLAW		
Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
162.	168.	165.0	62.0	63.2	62.6	79.0	81.2	80.1	48.5	53.2	50.9	35.0	36.2	35.6
137.	155.	143.9	47.0	59.8	54.3	57.0	68.0	61.7	33.0	43.8	38.2	29.4	35.0	31.5
136.	158.	145.5	46.5	58.5	54.0	54.4	62.5	56.4	33.0	39.2	36.2	27.3	32.5	30.0
161.	174.	168.5	56.5	62.8	60.4	75.0	90.0	80.7	47.6	51.5	49.4	34.1	34.3	34.2
141.	145.	146.3	47.5	59.2	54.4	65.9	78.0	72.1	33.9	43.2	40.7	30.0	35.3	32.7
141.	159.	148.8	49.0	61.0	54.4	57.0	68.0	63.5	33.0	41.5	37.8	28.5	34.0	31.0

*Males.*2 adults
(*semipalmatus*)36 adults
(*fasciatus*)46 adults
(*griseus*)*Females.*1 adult,
2 juvenals
(*semipalmatus*)23 adults
(*fasciatus*)50 adults
(*griseus*)

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW MEXICAN SKINKS OF THE GENUS
EUMECES.

BY EDWARD H. TAYLOR.

Among the spoils of a collecting trip made in the summer of 1932 by Hobart Smith and myself in Mexico are two forms of the genus *Eumeces* which appear to be unnamed. These are from the southern part of Mexico; one, the smaller, from the central part of the State of Guerrero; the other, a larger form, from the State of Mexico.

The smaller form seems to show relationship with the *brevirostris* group, which is largely Mexican in distribution. The second form has been known since 1885 when Cope¹ published a short description of the form under the name of "*Eumeces brevirostris* Gthr. Var."

Despite the fact that Cope associated the species with *E. brevirostris*, I am of the opinion that the relation is not with this group. I suspect that its nearest relationship is with *Eumeces anthracinus* or *Eumeces septentrionalis*, although not closely related with either.

***Eumeces ochoteranae*, sp. nov.**

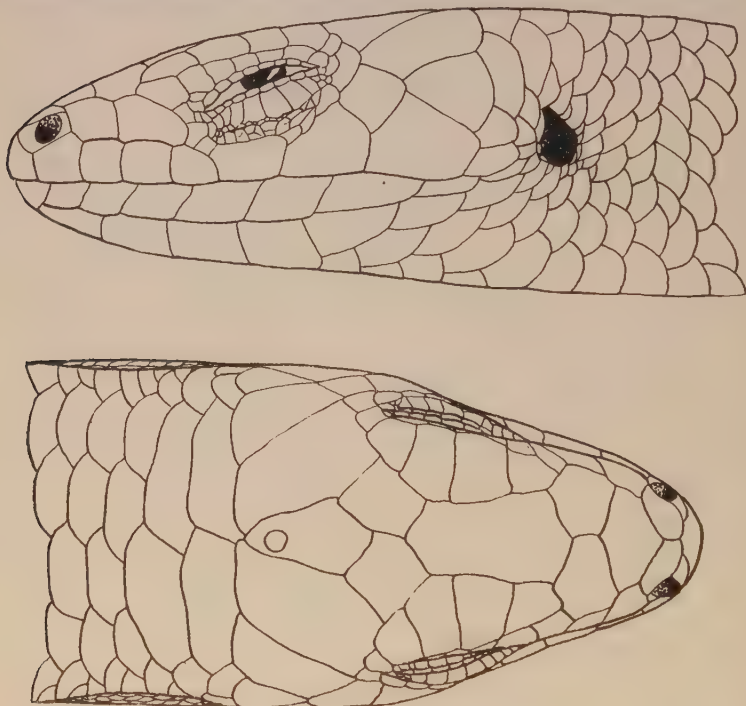
Type.—No. 1015. Taylor-Smith Collection; collected June 26, 1932, Mazatlan (4 miles north of Chilpanzingo), Guerrero, Mexico, by Edward H. Taylor and Hobart Smith.

Diagnosis.—A small slender species, with limbs small, widely separated when adpressed; four supraoculars; interparietal not enclosed; two pairs of nuchals; seven upper labials; postmental single; no postnasal; primary temporal sometimes in contact with lower secondary temporal, separating seventh labial from the upper secondary temporal; scale bordering the inner side of the elongate postgenial, wider than long; subcaudals widened; 22 (24) scale rows. Blackish or brownish with broad dorsolateral light

¹Proc. Amer. Phil. Soc., Vol. XXII, 1885, p. 387.

stripes on the back running to tail; a lateral line on labials to forearm; a black or black-brown lateral stripe; no trace of a median light line or forking lines on the head.

Description of the type.—Rostral much wider than high, the portion visible from above less than half the area of the frontonasal; internasals normal in size, forming a median suture, touching the anterior loreals; frontonasal six-sided, forming its longest sutures with the prefrontals, its shortest with the anterior loreal; prefrontals wider than long, forming a strong median suture and subequal sutures with the first supraocular,



Eumeces ochoterenae, sp. nov.

Taylor-Smith Coll. no. 1015 Type.

Head, lateral and dorsal views. Actual head length 7.4 mm.

first superciliary and the two loreals; frontal longer than its distance from the tip of the snout bordered by the three anterior supraoculars; first supraocular equally as large as fourth, second largest; frontoparietals small, square, forming a median suture; interparietal narrow, elongate, not enclosed behind by the parietals; latter diagonal, twice as long as their greatest width, narrowly separated posteriorly; two pairs of broad nuchals of about equal size; nasal small, the anterior part triangular, nearly as

large as remainder of scale including the nostril; no postnasal; anterior loreal nearly as long as high, distinctly higher than second loreal, which is about once and one half as long as high; seven-eight superciliaries; two presuboculars, the lower largest; three postsuboculars; seven upper labials, the first higher than the four succeeding scales; seventh labial somewhat larger than sixth; separated from the upper secondary temporal; the primary temporal, small quadrangular touching lower secondary, which is fan shaped; upper secondary elongate, once and two-thirds as long as its greatest width; tertiary temporal narrow and elongate, not entering the ear; seventh labial separated from the ear by two subequal pairs of postlabial scales; ear opening small with one or two very black auricular lobules. Upper medial palpebral scales not separated from the superciliaries; lower eyelid with three enlarged opaque scales, separated from the subocular by two or three rows of small granular scales; six lower labials, last longest; mental moderate having a labial border very slightly longer than the rostral; a single azygous postmental; three pairs of chinshields, the second pair largest; the third pair followed by an elongate postgenial bordered internally by a scale broader than long.

Body scales in 22 rows about the middle, the dorsal scales slightly larger than laterals or ventrals; scales on neck behind ear in 30 rows; narrow part of the neck, 23 rows; about base of tail 15 rows; the subcaudal scales two and one-half to three times as wide as long, and 94 scales from anus to tip of tail; from occiput to above anus 54; lateral scale rows generally parallel; marginal pits on scales numerous about insertion of arm and leg, but elsewhere dim or wanting; two enlarged preanals with two smaller scales on each side, border the anus; the outer scales overlapping inner; lateral postanal scale slightly differentiated.

Palm with several enlarged tubercles with many smaller ones; the wrist tubercle prominent; lamella formula, 4 : 8 : 10 : 10 : 6; the sole with one or two differentiated scales; the heel bordered by four flat scales or tubercles; lamella formula of foot, 5 : 8 : 10 : 12 : 8; the terminal lamellae not tightly bound about base of claws.

Color.—Above blackish to gray-brown with irregular minute darker flecking; a broad dorsolateral light gray-white line originating on the rostrals, passes back over head and along side and on to the proximal third of the tail; this line occupies the outer two-thirds of the second scale row, and the inner half of the third; this color is not clear, but is dirty looking due to flecking with darker color; a lateral line begins on the rostral and passes back to the near insertion of foreleg; only the lower edge of the auricular opening is involved; the color becomes much intensified below the eye and from there on is a silvery white; lower labials, chin, and throat light; abdomen, sides, and under limbs grayish or bluish gray flecked with minute darker areas; tail brownish at base, but distal two-thirds is of a very deep purplish blue color, less pronounced below.

TABLE OF MEASUREMENTS AND SCALE COUNTS OF THE TYPE SERIES.

Number.....	type 1015	1481	1483	1480	1012	1013	1482	1014	1484	1016	1017
Sex.....	♂	♂	♀	♂	♂	♂	♂	♂	yg.	yg.	yg.
Snout to vent.....	56	53	51.5	51.2	51	50.5	50	49.6	26	25.5	23
Tail.....	91	—	—	—	—	—	—	—	30	—	—
Snout to fore limb	17.2	16	16	16.5	16	15.7	16	16	10.2	8.9	9
Snout to ear.....	9	9.4	8.9	9	8.7	—	8.5	8.5	5.5	5.3	5.2
Axilla to groin.....	33	30.5	30	29	30	29	33	29	12	12.5	12.2
Width of head.....	6	7	7	7	7	7	6.7	6.3	—	—	—
Length of head.....	7.4	8	7.5	7.5	7.3	7.7	7.5	7.2	5	5	5.1
Width of body.....	8	8.7	8	9	8	7.8	7	8	4	4	3.8
Foreleg.....	8.9	10.2	9.8	10.7	9	9.2	9.2	9.2	5.2	4.4	4
Hindleg.....	14.1	14	13	14.3	13	13	13	13	8	7	5.8
Scales rows.....	22	23	22	24	22	22	23	23	22	23	22
Interparietal in- closed.....	no	no	no	no	no	no	no	no	no	no	no
Scales occiput to anus.....	55	54	54	55	56	53	55	54	54	57	55
Upper labials.....	7	7	7	7	7	7	7	7	7	7	7
Supraoculars.....	4	4	4	4	4	4	4	4	4	4	4
Nuchals, pairs.....	2	2	2	2	2	2	2	2	2	2	2
Postmentals.....	1	1	1	1	1	1	1	1	1	1	1
Postnasals.....	0	0	0	0	0	0	0	0	0	0	0
Largest labial.....	7	7	7	7	7	7	7	7	7	7	7
Frontonasal touches frontal.....	no	no	no	no	no	no	no	yes	no	no	no
Supraoculars touch frontal.....	3	3	3	3	3	3	3	3	3	3	3
Seventh labial touches upper secondary tem- porals.....	no	no	no	yes	no	no	no	yes	yes	yes	yes

Variation.—The chief variations are listed in the table. The scales preceding the ear between ear and seventh labial are usually as described, but may be replaced by two elongate ones, or three, the two upper uniting. The character of the temporals (the relation of the seventh labial to the upper secondary temporal) is variable, and they are separated in about half of the specimens and form a common suture in the other half. The number of subcaudal scales varies from 84 to 90.

Relationship.—This form is apparently related to *Eumeces brevirostris*, but differs in having a lower average count of scale rows; smaller and shorter limbs; the much broader dorsolateral line (separated by two whole and two half dark colored scales); the absence of a lateral light line along the sides of abdomen; the retention of blue color in the tails of adults and a smaller average of scales from parietals to anus (usually 6 to 8 less).

Habitat.—This form was first encountered at Mazatlan, near Chilpanzingo, Guerrero, Mexico, June 26, 1932. The specimens were routed from under stone and leaves and the rotting masses of agave plants. A few days later, July 1, 1932, several specimens were taken high in the

mountains in pine forest between the villages of Rincon and Cajones, south of Chilpanzingo. These specimens were found usually in rock ledges and under leaves at the base of large boulders.

A total of eleven specimens were taken. No other species of the genus was found in our collecting in the State of Guerrero.

The species is named for Dr. Isaac Ochoterena, Director of the Instituto de Biología, Chapultepec, Mexico, D. F. Mexico, a noted Mexican histologist and botanist, as an expression of appreciation for innumerable courtesies extended to Mr. Smith and myself while sojourning in Mexico.

***Eumeces copei*, sp. nov.**

Type.—No. 3859, Taylor-Smith Collection; collected 10 miles southeast of Asuncion, in the western part of the State of Mexico, Mexico, August 4, 1932, by Edward H. Taylor and Hobart Smith.

Diagnosis.—A moderately large form, having well defined lateral and dorsolateral white lines, but lacking any trace of a median white line or forking light lines on the head; the limbs small, widely separated in adults when adpressed on sides of body; four supraoculars, three touching the frontal; two pairs of nuchals; seven labials, last largest or equal to sixth; a single postmental; no postnasal; large primary temporal in contact with lower secondary temporal and equal or larger in size; a broad scale bordering the post-genial internally; scales in 22 or 24 rows about the middle of body.

Description of the type.—Adult female. Rostral moderately high, the part visible above one-third or less, than the area of the frontonasal, in contact with the frontal and forming sutures with nasals, prefrontals, and the anterior loreal; prefrontals quadrangular, the longest side forms the frontonasal suture; the sutures with the frontal next in size; that with the second loreal larger than the sutures with anterior loreal, superciliary, or anterior supraocular; frontal large, broad anteriorly, the anterior end a very obtuse angle, as is the posterior; in contact with three supraoculars; two irregularly rectangular frontoparietals forming a median suture one-third their length; interparietal large, broad, not enclosed by the parietal; parietals large, irregularly hexagonal; two pairs of nuchals, the anterior pair largest; nasal relatively small, the part in front of nostril much smaller than the posterior part including nostril; no postnasal; anterior loreal much higher than wide, distinctly higher than posterior loreal, which is longer than high; two presuboculars, the anterior largest; three postsuboculars, the upper largest; primary temporal large equal in area and broadly in contact with the lower secondary temporal, separating the seventh labial from the upper secondary temporal; tertiary temporal small elongate, widened medially; a pair of postlabials border anterior edge of the ear, the lower elongate; seven upper labials, four preceding the subocular, of which the first is the largest; sixth and seventh very large, of about same area; eye with four enlarged scales on lower lid separated from the subocular by three rows of minute tubercles; six superciliaries, the anterior large, the second less than half its size; mental large, having a longer labial border than the rostral; a single large azygous postmental; six lower labials, the

last elongate; three pairs of chinshields, the first in contact medially; the postgenial elongate, bordered on anterior inner edge by a scale broader than long.

Scales on the body large, in 22 (or 24) rows, larger dorsally than ventrally, the rows parallel on the sides; about the neck posterior to the ear 28 rows; about narrow part of neck 26 rows; behind arm 29 rows and 15 about base of the tail; scales from occiput to above the anus 61; scales above and behind insertion of limbs with numerous pits on posterior borders; scales under tail widened about $2\frac{1}{2}$ times as wide as long; anus bordered by two median preanal scales and two smaller scales on each side, the outer scales overlapping the inner; a very small area of small tubercular scales in axilla; lateral postanal scale enlarged but not strongly differentiated.

Limbs small, weak, widely separated when adpressed; palm with several enlarged rounded scales mixed with smaller; the wrist tubercle on outer edge of under side of wrist not especially enlarged; lamella formula for fingers: 5 : 8 : 11 : 10 : 6; foot with (normally) four enlarged tubercles bordering the heel; usually one enlarged tubercle on the sole with other smaller tubercles; lamella formula: 4 : 7 : 10 : 12 : 9; fourth toe with intercalated lateral scales only at base of the proximal phalanx.

Color, from life.—Above the general color is a brownish olive to light chocolate; a very distinct, very narrow creamy white dorsolateral line begins on the rostral, passes back along the sides of the head and along the side of body to some distance on the base of the tail, occupying the median third of the third scale row. A cream white lateral line begins on rostral, passes along the lower part of the first four labials, then rises somewhat, passing across the upper part of the succeeding labials, reaching middle and upper edge of ear; behind ear it begins on lower half of the ear edge, then bends down slightly, continuing back above arm along the side and to some distance on the tail. A deep black or black-brown stripe begins on the side of the head, runs along the side, occupying the area between the light lines and bordering the inner edge of the lateral; on the median part of the back there are five brown lines; the three median, which follow the edges of the scale rows, are quite distinct, but are much lighter in color and narrower than the deep black-brown lines bordering the light dorso-lateral lines; head with a few black-brown spots; below the lateral light line, sides black-brown, each scale with a lighter grayish area forming more or less distinct lighter lines; lower labials, chin, abdomen, underside of limbs, and tail dirty grayish to bluish gray, the preanals showing some brownish color; scales of arm and leg showing irregular light dots, the fingers with cream dots on each scale, the toes only partly so; soles and palms bluish black.

MEASUREMENTS AND SCALE CHARACTERS OF *Eumeces copei* sp. nov.

Number.....	type 3859	3870	3871	3884	3860	3864	3886	3888	3896	3895	3898
Sex.....	♀	♀	♂	♀	♀	♂	♂	♂	♀	yg.	yg.
Snout to vent.....	76	76	67	65	63	60	55	50	45	34	29
Tail.....	—	—	95	—	—	—	—	71	—	49	—
Snout to forelimb.....	23	22.2	20.5	18.6	19	20.3	18	16	13	12	11
Snout to ear.....	12	12.3	12	11	10.8	10.5	10	9.4	8	7	6
Axilla to groin.....	47.5	45.5	38	40	37.5	34	30	28	28	19	15
Width of head.....	10	9.5	9.5	9	8.2	9	8.6	7	7	6	5
Length of head.....	11	10.3	10.2	9.8	9.3	9.5	9.2	8.7	7.7	6.8	6
Width of body.....	11.5	12	10.5	10	10	9	9.2	8	8.2	7	6.5
Foreleg.....	13.8	14	15	13.5	14	12.6	13	11	10.2	8.5	7.5
Hindleg.....	18.2	19.4	20	18	18.2	18	17	16	14	11.2	9.2
Scale rows.....	22	24	23	23	24	22	24	22	22	24	24
Interparietal in- closed.....	no	no	no	no	no	no	no	no	no	no	no
Scales occiput to anus.....	60	64	63	63	60	60	62	62	64	63	63
Upper labials.....	7	7	7	7	7	7	7	7	7	7	7
Supraoculars.....	4	4	4	4	4	4	4	4	4	4	4
Nuchals, pairs.....	2	2	2½	2	2	2	2	2½	2	2	2
Post mentals.....	1	1	1	1	1	1	1	1	1	1	1
Post nasals.....	0	0	0	0	0	0	0	0	0	0	0
Largest labial.....	7	7	7=6	7	7	7=6	7=6	7=6	7=6	7=6	7=6
Frontonasal touches frontal.....	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes
Supraoculars touch frontal.....	3	3	3	3	3	3	3	3	3	3	3
Seventh labial touches upper secondary tem- poral.....	no	no	no	no	no	no	no	no	no	no	no

Variation.—In the series available for study, there are 36 specimens.² All show a rather decided tenacity to the color pattern described, and moreover it seems to be retained in both sexes to old age with very little change save that the bluish color of the tail is lost early. There is some variation in the shades of brown forming the ground color and in a few specimens the three chocolate lines bordering the edges of the three median scale rows are dim or rarely missing; occasionally, the dark spots on the dorsal part of the head are wanting.

The scale characters show some variation. The frontal occasionally is separated from the frontonasal (8 times in 36). The parietals fail invariably to enclose the interparietal; the sixth and seventh upper labials are of about equal area, the seventh occasionally the largest; there are invariably four supraoculars, three of which touch the frontal (one exception); seven upper labials (one exception with six); the scales about the ear vary be-

²I have just examined another specimen of this species which Dr. G. K. Noble has forwarded from the American Museum of Natural History (No. 19293 Santa Lucia, Distrito Federal, Mexico). It is a young specimen lacking the three median brown lines.

tween 15 and 17; invariably one postmental and no postnasal; superciliaries vary between six and seven (five in two specimens). Usually one auricular lobule (rarely two, or none, enlarged). The frontonasal invariably touches the first loreal. The lamellae under the fourth toe vary between 12 and 14, 13 being the most frequent number (two specimens have 16 on one side); postsuboculars usually three (three exceptions with four). In the greater part of the specimens the primary temporal is larger than the lower secondary (which is unusual in the genus) and is invariably in contact with it, thereby separating the seventh labial from the upper secondary temporal. The limbs when adpressed fail to touch save in the smallest specimens (29–34 mm.) where they may overlap one or two millimeters.

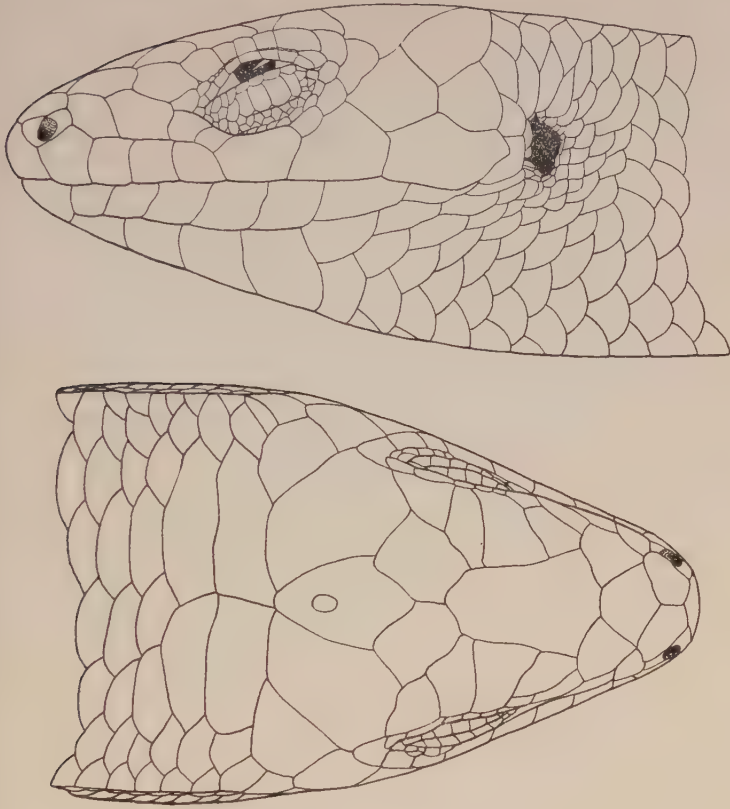
Habitat.—The specimens were found for the most part under rocks or logs. A single specimen was obtained by Hobart Smith in the lava field along the highway between Mexico City and Cuernavaca about 60 kilometers from the type locality. The others of the type series were found in the western part of the State of Mexico, Mexico, between Toluca and Asuncion at elevations between 6000 and 9000 feet.

There are two specimens belonging to this species in the United States National Museum, but both are from indefinite localities. One is a discolored specimen with the color pattern practically obliterated (no. 7037 from "Mexico"); the other is the specimen mentioned by Cope *loc. cit.* This specimen shows the color pattern. It is from "Either the valley of Mexico, or the adjacent one of Toluca."

In the Museo Nacional de Mexico there is a specimen presumably from the mountains between Mexico City and Toluca which is labelled *Eumeces "herrerae."* A search through available Mexican publications, and inquiries made, fail to show that this name was published.

Remarks.—The type series numbers 32 specimens of various age and sex. An examination of the sex organs fail to disclose whether the form is ovoviviparous or not. All the females lack developing eggs, save the United States National Museum specimen, which shows five developing eggs in the ovaries. The stomachs contain a variety of insects belonging to several families, chiefly coleoptera and blattids. No ants were observed.

The species is named for Edward Dinker Cope, who first noted the form, but failed to give it a name.



Eumeces copei, sp. nov.

Taylor-Smith Coll. no. 1827—near Tres Marias, Morelos, Mexico.
Head, lateral and dorsal views. Actual head length 10.2 mm.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

FERN MISCELLANY—III.¹

BY WILLIAM R. MAXON.

Herewith are presented notes on several tropical American ferns. They are additional to two earlier papers under the same general title.²

SCHIZAEACEAE.

Actinostachys penicellata (H. B. K.) Maxon.*Schizaea penicellata* Humb. & Bonpl.; Willd. Sp. Pl. 5: 86. 1810.*Schizaea subtrijuga* Mart. Icon. Crypt. Bras. 117. 1834.

This name having been used in identifying recent Trinidad material, the formal transfer may appropriately be made.

CYATHEACEAE.

Alsophila phalaenolepis C. Chr.

Founded on an Ecuador plant in the Bonaparte Herbarium, collected by Sodiro in 1904. Agreeing closely is a complete isotypic specimen in the National Herbarium. The range of this species is considerably extended by material collected in the Dagua Valley, Dept. El Valle, Colombia, in 1922, as follows: Córdoba, alt. 80-100 meters, *Killip* 5103; Santa Rosa, alt. 200-300 meters, *Killip* 11528, 11566. No. 5103 shows a slender erect rhizome more than 20 cm. long, as opposed to the very short rhizome in the type specimen.

GLEICHENIACEAE.

Dicranopteris nuda (Moritz) Maxon.

With recent exploration this species appears much commoner than previously noted.³ The following specimens are now at hand:

VENEZUELA: Colonia Tovar, *Moritz* 452 (type); *H. Pittier* 9344. Mountains near Galipán, *E. Pittier* 128. Between El Carrizel and San Diego, alt. 1,400 m., *H. Pittier* 12983. Tabay, alt. 2,200-2,300 m., *Gehriger* 407. Mountain above Caracas, *Woronow* 7215.

COLOMBIA: Santa Marta, *H. H. Smith* 1116.

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²Proc. Biol. Soc. Washington 43: 81-88. 1930; 46: 105-108. 1933.

³Contr. U. S. Nat. Herb. 24: 49. 1922.

Dicranopteris remota (Kaulf.) Maxon, Contr. U. S. Nat. Herb. **24**: 50. 1922.

Mertensia remota Kaulf. Enum. Fil. 39. 1824.

Gleichenia remota Spreng. Syst. Veg. **4**: 27. 1827.

Dicranopteris Williamsii Maxon, Amer. Fern Journ. **2**: 21. 1912.

In transferring this South American species to *Dicranopteris* in 1922, the writer overlooked the fact that *D. Williamsii*, founded on a Panama plant (*Williams* 917), should be included. The following additional specimens of *D. remota*, considerably extending the range, have been received in the interim:

TRINIDAD: Las Lapas Road, alt. 600 meters, *Homersley* 280, 327a, 327b, 327c. Trurure River forest, *Broadway* 7692.

COLOMBIA: "Isthmus of Darien," *Seemann*. San Vicente de Chucuri, alt. 1,500 meters, *Green* 39. San Jorge, Dept. Antioquia, alt. 1,350 meters, *Green* 30.

BRITISH GUIANA: Potaro River, *Jenman* (as *Gleichenia malaliensis* Jenman).

Dicranopteris seminuda (Klotzsch) Maxon.

Mertensia seminuda Klotzsch, Linnaea **18**: 538. 1844.

Gleichenia seminuda Moore, Ind. Fil. 383. 1862.

Founded on specimens from the region of Caracas, *Moritz* 91. Agreeing closely with a fragment of the original collection at the New York Botanical garden is the following specimen in the National Herbarium: Páramo del Molino, near Mérida, Venezuela, alt. 2,500 meters, Feb. 19, 1922, *A. Jahn* 943.

Dicranopteris Brittonii Maxon, Contr. U. S. Nat. Herb. **24**: 47. pl. 18. 1922.

Described from Mount Tocuche, Trinidad, on *Britton, Hazen & Mendelsohn* 1352. Recent additional material (*Broadway* 5657, 7134) from the same locality gives a much clearer idea of the vascular structure.

POLYPODIACEAE.

Polypodium microchasmum Baker, Journ. Bot. Brit. & For. **25**: 44. 1887.

The original material consists of only two specimens, (1) the actual type (at Kew), a single small incomplete frond, and (2) a somewhat smaller but better specimen in the Jamaica Herbarium (Hope Gardens), consisting of a sterile and a fertile frond attached to a portion of the rhizome, both specimens having been collected at Tweedside, Jamaica, by Mrs. Barrington Baker in October, 1885. The peculiar rhizome scales, scales of the under side of the blade, and remotely notched cartilaginous margins show the plant to be *P. plebeium* Schlecht. & Cham., a species not known otherwise from Jamaica. The species name given by Baker is most misleading, since the sori are not at all immersed in the blade, being only a little impressed in drying.

Paltonium lanceolatum (L.) Presl.

A widely distributed characteristic West Indian species, known heretofore in continental America only from Honduras (*J. D. Smith* 5667,

Standley 54003) and Florida. It has lately been collected in Chiapas, Mexico (*Mell* 2047).

***Adiantum Wilsoni* Hook.**

Known in the West Indies previously from Jamaica, Porto Rico, and Hispaniola, this species may now be reported from Cuba: Near Boyate, alt. 450 meters, in a small forest ravine, December, 1923, *Hioram* 6917. On the continent its range extends from British Honduras and Guatemala to the Isthmus of Darien. In the southernmost part of its range it overlaps *A. cordatum* Maxon,⁴ of eastern Panama, which it superficially resembles, but that species departs widely in its wholly areolate venation.

***Cheilanthes longipila* Baker.**

A rare Mexican species, founded on *Parry & Palmer* 989, from the region of San Luis Potosí, alt. 1,800–2,400 meters, which is lacking in the Gray Herbarium and the National Herbarium. Agreeing with the type specimen (at Kew) are the following more recent collections: Barranca near Guadalajara, on shaded ledges, *E. Palmer* 78; *Pringle* 1863, 11776. These were originally misidentified as *C. Cooperae* Eaton, a California species.

***Cheilanthes albidia* Baker.**

Founded on specimens collected in "22° N. Lat., alt. 6,000–8,000 ft., chiefly in the region of San Luis Potosí," Mexico, by *Parry & Palmer* (no. 999), and recognized in *Christensen's Index Filicum* as a valid species. The type at Kew is, however, annotated by Underwood as *C. Lindheimeri* Hook., and examination of an excellent isotype, until recently misplaced, in the National Herbarium confirms this opinion. This species is common in the southwestern United States, and extends southward sparingly through Sonora, Chihuahua, and Durango to San Luis Potosí.

***Pteridium psittacinum* (Presl) Maxon.**

Pteris psittacina Presl, *Delic. Prag.* 1: 185. 1822.

In the Kew Herbarium there is a Brazilian specimen collected by Martius, identified by Baker as *Pteris aquilina* var. *psittacina*, which agrees fairly well with Presl's original description of *Pteris psittacina* (based on a small sterile plant), apparently representing a valid species. The main points of distinction are the fine dissection of the small blade, which thus resembles certain species of *Hypolepis*, and the pronounced but variable white- or sordid-setulose covering of hairs on both surfaces and particularly along the margins. Other specimens at hand are as follows:

BRAZIL: Blumenau, Prov. Santa Catharina, Nov., 1887, *Ule* (?) 290 (identified by Christ as *Hypolepis nigrescens*); Rio de Janeiro, marsh, July 17, 1927, *Harshberger* 885.

COSTA RICA: Near San José, alt. 1,035 meters, *Cooper* (J. D. Smith, no. 6018); without locality, *Werckle* (both identified by Christ as *Hypolepis nigrescens*).

⁴Amer. Fern Journ. 21: 136. 1931.

DOMINICAN REPUBLIC: Laguna de Cenobi, Monción, Prov. Monte Cristi, alt. 1,100 meters, *Ekman* H. 12990.

HAITI: Near Mission, alt. 1,000 meters, *Leonard* 3916.

Of this material only the Harshberger specimen is fertile, showing plainly the "double indusium" characteristic of the genus.

***Asplenium rutaceum* (Willd.) Mett.**

This species, founded on illustrations of a Hispaniola plant collected by Plumier, has recently been found again in that island by Ekman (no. H. 5447). It should have been included by the writer in the "Pteridophyta of Porto Rico,"⁵ Urban's identification⁶ of a specimen (at Berlin) collected long ago by Schwanecke having been found correct. This species is not otherwise known from the West Indies, the Jamaica plant so listed by Jenman being *A. conquisitum* Underw. & Maxon. In northern South America it is not especially uncommon.

***Diplazium verapax* (Donn. Sm.) Hieron. Hedwigia 59: 322. 1917.**

Asplenium verapax Donn. Sm. Bot. Gaz. 13: 77. pl. 2. 1888.

Asplenium cordovense Baker, Ann. Bot. 8: 125. 1894.

Diplazium cordovense C. Chr. Ind. Fil. 230. 1905.

Asplenium verapax, founded on a Guatemala plant collected by von Türckheim (J. D. Smith, no. 850), was reduced subsequently⁷ by Capt. Smith to *A. Riedelianum* Bong., of Brazil, and this view may be correct, in spite of the distinctions stated by Hieronymus⁸ in recognizing both as valid species under *Diplazium*. The present note, however, is to point out that *D. cordovense* (Baker) C. Chr., differs in no important detail from *D. verapax*. The type of *A. cordovense*, at Kew, is a plant collected near Cordova, Veraacruz, Mexico, by H. Finck (no. 143), and is matched by a specimen of the same collection in the U. S. National Herbarium (no. 47), which certainly is indistinguishable from the type specimen (figured) of *A. verapax*. Two specimens of *D. verapax* are at hand also from western Panama (*Cornman* 951, 1266). This species is variable not only in soriation but in relative length of the basal pinnae and in lobation toward the apex.

***Blechnum nigrosquamatum* Gilbert, Bull. Torrey Club 24: 258. 1897.**

Founded on *Bang* 2314, from Colopampa, Bolivia, in running water, July 4, 1894, and listed in the Index Filicum as valid. It differs in no respect, however, from *Blechnum brasiliense* Desv., widely known from Brazil, Paraguay, Argentina, Uruguay, and Peru, and from at least two other Bolivian collections (*Buchtien* 3359, *Williams* 1148).

***Leptochilus Stuebelii* (Hieron.) Maxon.**

Hypoderris Stuebelii Hieron. Hedwigia 46: 223. 1907.

Examination of the two type specimens from Ecuador (*Stübel* 906), courteously lent from Berlin, shows at once that, although sterile, they are

⁵Sci. Surv. Porto Rico 6: 373-521. 1926.

⁶Symb. Antill. 9: 332. 1925.

⁷Bot. Gaz. 15: 29. 1890.

⁸Hedwigia 59: 322-323. 1917.

by no means referable to *Hypoderris*, even if we regard that genus in its present inclusive sense. They represent a species belonging to the group of *Leptochilus nicotianaefolius*, the nearest relationship being with *L. Bradeorum* Rosenst., of Costa Rica. Like *L. Bradeorum* and *L. hemiotis* Maxon, of Trinidad, *L. Stuebelii* is viviparous in the axils of the lateral pinnae.

***Dryopteris lingulata* C. Chr.**

At the time of its description in 1913 this striking species (subgenus *Meniscium*) was known only from a single collection, *Pittier* 10349, from the lowlands of Costa Rica. Additional material in the National Herbarium is as follows:

COSTA RICA: Hamburg Finca, on Río Reventazón below Cairo, alt. 55 meters, *Standley & Valerio* 48659.

PANAMA: Foothills of Garagará, Sambú Basin, southern Darien, alt. 30–500 meters, *Pittier* 5596.

COLOMBIA: Tutunendo, 20 km. north of Quibdó, Intendencia del Chocó, alt. 80 meters, *Archer* 2130.

The known range thus greatly extended is an entirely natural one.

***Tectaria Buchtienii* (Rosenst.) Maxon.**

Aspidium Plumieri var. *brasiliense* Rosenst. *Hedwigia* **46**: 113. 1906.

Aspidium Buchtienii Rosenst. *Repert. Sp. Nov. Fedde* **11**: 55. 1912.

There is at hand a specimen of the type collection, from Bolivia; Antahuacana, Espiritu Santo, alt. 750 meters, in shady forest, June, 1909, *Buchtien* 2171.

***Ormoloma* Maxon, gen. nov.**

Rhizoma repens, tenue, paleaceum. Folia pauca, subdisticha, 1-pinnata, stipitibus rachibusque atropurpureis; pinnae paucae, nonarticulae, sublanceolatae, crenatae, subaequales, costa percurrente, venis liberis distantibus 1–3-furcatis, venulis ad basin dentium egredientibus; sori terminales, intramarginales, plerumque solitarii, superficiales, transversi, dentibus herbaceis oppositis multo minores; indusia membranacea, semi-orbicularia vel anguste lunata, marginibus parallela, tantum basi lata affixa; sporangia multa, annulo 10- vel 11-articulato, sporis triplanatis trilobatis.

Rhizome creeping, very slender, laxly and deciduously paleaceous; roots radiculose. Fronds few, distant, subdistichous, suberect, simply pinnate; stipe and rachis atropurpureous, lustrous; pinnae few, nonarticulate, petiolulate, of a lanceolate type, crenate, subequal, the terminal one conform; costa medial and percurrent, the lateral veins few, distant, free, mostly 1–3-forked, the branches excurrent singly to base of marginal crenations; sori terminal, intramarginal, mostly solitary, superficial, much smaller than the opposed herbaceous (unmodified) crenations, transversely elongate; indusia semiorbicular to narrowly lunate, parallel to the margin, affixed at broad base only, membranous; sporangia numerous, the annulus 10- or 11-celled; spores triplanate, trilobate.

A single species, the genotype, *Saccoloma Imrayanum* Hook.

The fern under consideration was first described under *Saccoloma*, from material collected by Imray in Dominica. It was later referred to *Davallia*

by Hooker, doubtfully to *Humata* by Kunze in 1857, and definitely to *Acrophorus* by the latter writer in 1861. Kuhn (1882) placed it in another Old World genus, *Schizoloma*, but Diels removed it to *Saccoloma* again, at the same time commenting⁹ on the tenuous lines separating the genera of Davallieae and the need of a thorough revision of the tribe. By the writer it has long been regarded as the type of a new genus. This opinion is shared by Copeland, who in recently subdividing *Saccoloma* pointed out¹⁰ the essential characters but courteously refrained from naming the genus. From *Saccoloma* (properly restricted to *S. elegans* Kaulf.) and *Ithyaulon* Copel.,¹¹ which are characterized by massive erect rhizomes, saccate or even cornucopiate indusia, and a 14- to 19-celled annulus, *Ormoloma* departs widely in its very slender creeping rhizome, its nonsaccate indusia (attached only at the horizontal base), and its 10- or 11-celled annulus. The indusial characters are shown fairly well in the illustrations herewith cited:

***Ormoloma Imrayanum* (Hook.) Maxon.**

Saccoloma Imrayanum Hook. Gen. Fil. pl. 58, B, f. 5, 6. 1839, nomen;
Kunze, Farnkr. 1: 86. 1842.

Davallia Imrayana Hook. Sp. Fil. 1: 171. pl. 49, A. 1846.

Specimens are at hand from Dominica (*Lloyd* 881), Guadeloupe (*l'Herminier*; *Duss* 4176), Haiti (*Ekman* 7425), British Guiana (*im Thurn* 120), and French Guiana (*Leprieur* 117), the altitudes ranging from 750 to 1,750 meters.

Reported from Costa Rica by Baker¹² on specimens collected by J. J. Cooper; but these, as shown by ample recent material from the mountains of Costa Rica and adjacent parts of Chiriquí, represent a closely allied second species of *Ormoloma* still to be described. Presumably referable to this new species also is the Costa Rican plant listed by Christ¹³ as *S. Imrayanum*. The systematic position of Christ's *Saccoloma Wercklei*, described from Costa Rica at the same time, is highly uncertain; but if the description¹⁴ is really credible, the plant must be related to *Saccoloma* in soriation characters, rather than to *Ormoloma*.

HYMENOPHYLLACEAE.

***Hymenophyllum lanatum* Fée.**

This species, previously known from Hispaniola, Jamaica, Cuba, and Guadeloupe, may now be reported from Porto Rico, on the basis of specimens collected long ago by Schwanecke, which were identified as *H. hirsutum* (L.) Swartz and were so listed by Urban. The material, which is scant and depauperate, has recently been studied on loan from Berlin.

⁹In Engl. & Prantl. Nat. Pflanzenfam. 14: 205. 1899.

¹⁰Univ. Calif. Publ. Bot. 16: 80. 1929.

¹¹Op. cit. 79.

¹²Journ. Bot. Brit. & For. 25: 24. 1887.

¹³Bull. Herb. Boiss. II. 4: 1099. 1904.

¹⁴Op. cit. 1100.

Hymenophyllum Cruegeri C. Müll. Bot. Zeit. 12: 722. 1854.

Hymenophyllum delicatissimum Fée, Crypt. Vasc. Brés. 2: 83. pl. 105, f. 1. 1872-73.

At Kew, in 1930, the writer's attention was called by Dr. Christensen to a sheet of excellent Trinidad specimens collected by Purdie and by Crüger, which had been annotated by van den Bosch as *H. Cruegeri* C. Müll., the Crüger element being presumably isotypic. The plants were found to agree with recent material identified as *H. delicatissimum* Fée, a later species founded on *Glaziou* 3591, from Brazil, which apparently must be reduced to synonymy. Besides fragments of both type collections, numerous specimens are at hand from Hispaniola, Guadeloupe, Grenada, Trinidad, and British Guiana.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF NEW SPECIES OF CRABS FROM
THE GULF OF CALIFORNIA.

BY MARY J. RATHBUN.¹

The specimens here described were taken by Mr. H. N. Lowe at San Felipe, May 6-15, 1933. The number of new species indicates the need of intensive exploration of this portion of the Gulf of California.

FAMILY XANTHIDAE.

Glyptoxanthus felipensis, sp. nov.

Type.—Male, U. S. National Museum Cat. No. 67569. Carapace one and a half times as broad as long, very broadly arched, the arch bending inward toward postero-lateral angle, and subentire, not broken into lobes. Surface patterned much as in *G. erosus*² but much rougher, the elevated portions finely granulate; the anterior mesogastric region narrow; proto-gastric regions divided longitudinally into two areas, the inner the narrower and marked by a chain of punctae. Cardiac, posterior gastric and inner branchial areas deeply punctate. A deep, transverse furrow limits the cardiac region; an uneven transverse groove across the intestinal region. Front narrow, lobes small, subtriangular, outer ones smaller. Ventral surface less excavated than in *erosus*. Length of carapace 29, width 44.4 mm.

Panopeus diversus, sp. nov.

Type.—Male, U. S. National Museum Cat. No. 67570. Allied to *P. chilensis*³ in general shape; carapace a little longer and narrower, more convex from front to back, and lacking the transverse, raised lines of granules. Front sinuous, with closed median fissure and an outer blunt tooth as in *chilensis*. Antero-lateral teeth projecting slightly outward; first tooth small, blunt, separated by a broad and very shallow sinus from the second tooth, which is broad, arcuate, and nearly transverse in direction.

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²Bull. 152, U. S. Nat. Mus., pl. 107.

³Bull. 152, U. S. Nat. Mus., pl. 160.

Third and fourth teeth of equal width and a little narrower than the coalesced first + second tooth. Sinuses between second, third and fourth teeth V-shaped; third tooth with obtuse inner angle and mostly a straight, oblique outer margin; fourth tooth equally wide, outer margin convex, inner end a right angle, tooth rounded; fifth tooth at widest part of carapace, small, directed forward. Tooth at inner angle of wrist very short and blunt. The dark color of fixed finger of major cheliped extends very slightly on the manus. Male abdomen wider than that of *chilensis*, its sides less concave; terminal segment less triangular, broadly rounded at extremity. Length of carapace, 32, width 43.6 mm.

***Hexapanopeus rubicundus*, sp. nov.**

Type.—Male, U. S. National Museum Cat. No. 67571. A larger species than *H. schmitti*,⁴ which it resembles. Carapace longer in proportion to width, front narrower in proportion to width. Areolation of carapace very distinct except on posterior fourth. Lobes of front oblique, more concave than in *schmitti*, the outer ends a rounder lobe. Antero-lateral lobes of carapace broadly triangular and shallow, the second lobe (from the orbit) scarcely dentiform, as it is in *schmitti*. Surface minutely granulate in anterior two-thirds. Color claret brown. Length of larger male 17.6, width 24.4 mm. Type collected by E. H. Quayle.

***Eurypanopeus confragosus*, sp. nov.**

Type.—Male, U. S. National Museum Cat. No. 67572. Allied to *E. dissimilis*.⁵ Surface of carapace very rough with numerous, short, transverse, granulated lines on the anterior two-thirds, as well as single granules irregularly distributed. Front advanced at middle, lobes slightly sinuous; a small, shallow, median V; edge of front claret brown (in alcohol). Of the antero-lateral teeth, the compound one (first + second) has a sinuous margin, the third has an obtuse angle, the fourth a right angle, the fifth is subacute. Minor manus two-thirds as high as major; both are densely granulate, the granules continued part way down the fingers, but of smaller size; fingers of minor chela spooned. Length of carapace 11.2, width 16.2 mm.

***Eurytium albidigitum*, sp. nov.**

Type.—Male, U. S. National Museum Cat. No. 67573. Carapace nearly one and a half times as broad as long, very strongly arched from front to back, slightly uneven in the gastro-branchial region; anterior part of mesogastric region outlined, also the H-form depression on the posterior middle of the carapace. Front subtruncate, the two halves trending slightly backward toward the median dorsal furrow. The customary inner orbital tooth is reduced and scarcely evident, forming an elevated rim which does not project laterally outward. Upper margin of orbit sinuous, trending forward and outward; of the two customary orbital sinuses, the

⁴Bull. 152, U. S. Nat. Mus., pl. 169, figs. 3-5.

⁵Bull. 152, U. S. Nat. Mus., pl. 173, figs. 1, 2.

inner is lacking in the oldest specimen. First, or compound, antero-lateral tooth long, with a shallow sinus, outer angle rounded; next, or third tooth following the trend of the preceding and separated by an almost rectangular sinus from the fourth tooth; last tooth at widest part of carapace, blunt, and directed obliquely forward and outward. Manus with a superior ridge well marked at proximal angle; fingers stout. Penult segment of male abdomen broader than long and diminishing in width toward fifth segment. Color, in alcohol, raw sienna, mottled with burnt sienna; fingers white. Length of carapace 30.2, width 44.7 mm.

***Pilumnus tectus*, sp. nov.**

Type.—Male U. S. National Museum Cat. No. 67574. Carapace and legs covered with a short, soft pubescence, with longer hairs interspersed on chelipeds and ambulatories. Carapace one-third wider than long, nearly smooth, and with faint indications of regions; convex longitudinally, the front not visible in dorsal view; a furrow from mesogastric region to the median V. Frontal lobes oblique, edge nearly straight, slightly convex, bordered with acute granules. Five antero-lateral spines, including the orbital, the first two very small, the other three larger, subequal, with a spinule on outer slope; first two interspaces subequal, shorter than the remainder. Outer surface of major carpus and manus covered with unequal sharp granules, except for a small space at lower distal end of manus and along its lower margin, which is smooth and bare. Fingers stout, nearly meeting, three enlarged teeth on dactyl, two still larger teeth at middle of fixed finger. Minor manus covered outside with granules and pubescence, fingers rather slender. Length of carapace 12.1, width 16.1 mm.

FAMILY DROMIIDAE.

***Hypoconcha lowei*, sp. nov.**

Type.—Female, U. S. National Museum Cat. No. 67575. Surface hairy above and below. Anterior margin of carapace arcuate, very slightly sinuous. Lateral angle bluntly rounded, not forming a distinct lobe as in *H. sabulosa*⁶ and kindred species; postero-lateral borders rapidly converging. A marginal row of four distant spines on either side of front, the anterior spine over the orbit. Lower surface of carapace mottled with acute granules but not sculptured. A short spine at angle of buccal cavity. Ischium of outer maxilliped coarsely granulate. Carpus of cheliped with two long spines inclined distad in a median row. About ten or twelve pointed tubercles scattered through middle of outer surface of manus; fingers finely granulate. Length of carapace 20, width 22.3 mm.

⁶*Cancer sabulosa* Herbst, Naturg. d. Krabben u. Krebse, vol. 3, pt. 1, 1799, p. 57, pl. 48, figs. 2, 3.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW WOOD OWL FROM MEXICO.

BY LEON KELSO.

The following new owl was found in a series of skins of this species in the U. S. National Museum.

Ciccaba virgata amptonotata, subsp. nov.

Subspecific characters.—Nearest to *Ciccaba virgata squamulata* Bonaparte, but spots on crown, hindneck, and back much larger, 3 to 8 mm. across instead of 1 to 3 mm., most of them pure white instead of buffy, some of them crescent-shaped, the white continuous across shaft, and there are no minute mottlings of grayish or buffy between the spots; greater, middle, and lesser primary coverts with many large white spots on each web, those on greater coverts often more than 8 mm. across; some of the feathers on the breast with a buffy or whitish spot, 3 mm. or more across, on each web, entirely enclosed by the dusky or dark brownish of the shaft stripe.

Type.—Adult, unsexed, U. S. Nat. Mus. No. 50,764, collected by A. J. Grayson, Mazatlan, Sinaloa, Mexico, Feb., 1868.

Range.—Western Mexico, from Michoacan north to northern Sinaloa, and east to Guanajuato.

Remarks.—Bonaparte described his "*Syrnium squamulatum*" in *Conspectus Generium Avium*, I, Pt. 1, June 24, 1850, p. 53, based on *Strix squamulata* ex Lichtenstein manuscript. The type of this was in the Leyden Museum and labeled simply "Mexico." He characterized it as having small buffy-white spots. Specimens from central and northern Oaxaca show this character and otherwise agree with his description. It is therefore likely that the type came from the region of Oaxaca.

A series of *Ciccaba v. centralis* and *C. v. squamulata* from this and other parts of southeastern Mexico and from Central America contains not one specimen with upper parts like those of *C. v. amptonotata* from Michoacan and northwestward.

There is no difference in average measurements, but the plumage around the head and neck is longer and looser. Six specimens of *C. v. amptonotata* have been examined by the writer.

PROCEEDINGS
OF THE
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THE THIRD SPECIMEN OF *ELAPHE ROSACEA*
(COPE).

BY M. K. BRADY.

In 1888 Cope described *Coluber rosaceus*, the type specimen coming from Key West (Proc. U. S. Nat. Mus. 1888, p. 388). As a Copeian species, based on a single specimen, it was disregarded, more or less, until, more than thirty years later, the second example was found, on Big Pine Key. Barbour, into whose hand this came, was as much impressed with the animal as Cope had been and promptly resurrected the species, now *Elaphe rosacea* (Copeia, No. 84, 1920, p. 68). Since then many visitors to the Lower Florida Keys, myself among them, have searched in vain for this striking snake. I now have before me the third specimen, alive, and have compared it with *Elaphe guttata*, the widespread form whose range includes the area in which *rosacea* may be found. I am indebted to Messrs. R. F. Deckert and Al. Pflueger, of Miami, Fla., for the privilege of examining this specimen. It was collected by Mr. Pflueger on Little Pine Key. The species apparently still survives on the few isolated Keys which support hammocks.

Color, rather than scalation and the pattern of the markings, will enable *rosacea* to be differentiated from *guttata*. The ground color of *rosacea* is a dark plumbeous in contrast to the light buff of *guttata*. The dorsal saddles, lightest anteriorly, are a darker red flecked with orange, differing from the even vermilion of the *guttata* saddles. The square black ventral spots are much the less distinct in *rosacea* which has the posterior two-thirds of the venter a bright orange, contrasting with the white ventral ground color of *guttata*. The species is characterized by the presence of four dark longitudinal stripes, a lateral and a median-dorsal pair. In the present specimen these stripes vary in intensity, being most pronounced immediately after

sloughing of the skin. Since *guttata* has been known to bear, occasionally, similar stripes, the character is not infallible.

Finally, preservation of *rosacea* is accompanied by marked fading of the red pigment of the saddles and lateral spots, as well as the longitudinal stripes. The dark dorsal ground color, however, remains quite pronounced—even in the type, after nearly half a century. This is quite the opposite from the case of *guttata*, in which the red pigmented areas remain well defined.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO NEW BIRDS FROM
SOUTHEASTERN SIAM.

BY J. H. RILEY.¹

In these Proceedings, volume 43, 1930, pages 189-192, three new birds were described from southeastern Siam from collections made there by Dr. Hugh M. Smith. In the same collection there were two forms that could not be determined at that time. Further study has convinced me that they are apparently undescribed. The first is a bulbul and the second a wren-babbler. They may be known from the following descriptions:

Ixos canescens, sp. nov.

Type, adult male, U. S. National Museum, no. 324,490, Kao Kuap, Krat, southeastern Siam, December 24, 1929. Collected by Hugh M. Smith (original no. 3560).

Similar to *Ixos griseiventer* (Robinson and Kloss) of south Annam, but the pileum a lighter brown with the shaft streaks reduced and less conspicuous; the back much darker citrine; the tail above dusky towards the tip not citrine for its whole length; tail below dusky instead of citrine; under tail coverts darker; the chest a more brownish gray and the shaft streaks much reduced in width and cartridge buff instead of grayish white. Wing, 94; tail, 91.5; culmen, 20.5; tarsus, 18; middle toe with claw, 16.5 mm.

Remarks.—Dr. Smith took a female two days later at the same locality. It does not differ essentially from the male and measures as follows: wing 92; tail 86; culmen 20; tarsus 18; middle toe with claw, 16.5 mm.

In my opinion, *Ixos griseiventer* does not belong in the same form-group as *Ixos maccllelandi tickelli*, and as *Ixos canescens* instead of being intermediate between *tickelli* and *griseiventer* is quite different from both and the ranges of all three are separated by wide stretches of country where no intermediates are known to occur, therefore *griseiventer* and *canescens* should be recognized as distinct until forms of intermediate character are discovered. Birds of the *Ixos maccllelandi* group of forms are larger with

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longer crests and the ear-coverts and chest are tinged fulvous, more or less intense.

***Corythocichla brevicaudata cognata* subsp. nov.**

Type, adult male. U. S. National Museum, no. 324,378, Kao Sabab, Chantabun, southeastern Siam, January 7, 1930. Collected by Hugh M. Smith (original no. 3625).

Similar in color to *Corythocichla brevicaudata striata* but the gray of throat deeper, the streaks much paler and upper parts darker, less rufescent.

Description.—Pileum and back snuff brown, lighter along the shaft and with the outer margins of the feathers seal brown; rump cinnamon-brown; forehead, superciliary, and sides of face, including the ear coverts neutral gray; chin and throat pale neutral gray streaked with neutral gray; breast cinnamon buff, deepening to mikado brown on the belly and crissum; sides and flanks cinnamon-brown; tail above mummy brown; the closed wing the color of the tail, the greater wing coverts and remiges with a triangular light buff spot at the tip; the primaries and outer secondaries blackish on the inner web. Wing, 57; tail, 35; culmen, 14; tarsus, 23; middle toe with claw, 19.5 mm.

Remarks.—Doctor Smith secured a male and female at the type locality and a male at Kao Kuap, Krat. The female from the type locality differs from the type in being much lighter on the breast, but the chin and throat are more heavily streaked. The male from Kao Kuap has the chin and throat more heavily streaked than the type and even grayish streaks on the breast and belly and the center of the breast is much lighter, near tilleul-buff.

The female from the type locality measures: wing, 57; tail, 35; culmen, 13; the male from Kao Kuap: wing, 61; tail, 41; culmen, 14 mm.

Corythocichla griseigularis Delacour and Jabouille from Bokor, S. Cambodia, is evidently closely related, but it is described as having a uniform gray throat and chest.

Corythocichla leucosticta, *Corythocichla venningi* and two or more of the Indo-Chinese forms with longer wings and longer tails do not belong to the *brevicaudata* form group at all, in my opinion.

PROCEEDINGS
OF THE
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A SECOND SPECIES OF ORMOLOMA.¹

BY WILLIAM R. MAXON.

In describing² not long ago a new davallioid fern genus, *Ormoloma*, based upon *Saccoloma Imrayanum*, a rare but comparatively well-known plant of the Lesser Antilles and the Guianas, reference was made to a closely related form occurring in the mountains of Costa Rica and western Panama. This is described herewith and contrasted with the genotype species.

Ormoloma Standleyi Maxon, sp. nov.

Rhizoma tenue repens, paleis divaricatis brunneis majusculis praeditum. Folia subdisticha erecta plura, omnino glabra, stipitibus quadrangulatis tenuibus laminas pleurumque aequantibus; laminae oblongae, 1-pinnatae, apice acutae; pinnae subaequales alternae obliquae elongato-lanceolatae crenulatae, e basi petiolulata anguste cuneato-excavatae; sori solitarii terminales intramarginales; indusia transverse oblonga vel anguste lunata, basi lata affixa, marginis dentibus subrotundis herbaceis immutatis multo minora.

Rhizome creeping, very slender (1-2 mm. thick), firm, castaneous, sparingly branched, densely paleaceous; scales divaricate, subpersistent, 2-2.5 mm. long, 0.5-1 mm. broad, pointed-oblong to deltoid-ovate and long-acuminate, firmly attached at emarginate base, entire, bright brown, sublathrate, the cells inflated, with yellowish outer walls. Fronds several, 0.5-2 cm. apart, subdistichous, erect, 20-40 cm. long, the stipes about equaling the blades, slender, quadrangular, castaneous, lustrous, naked, glabrous; blades simply pinnate, oblong, acute at apex, 10-25 cm. long, 4-9 cm. broad, the rachis similar to the stipe; pinnae 8-11 pairs, subequal (the terminal one conform, rarely lobed at base), alternate, oblique, distant, obliquely lance-attenuate, crenate, variable in length (mostly 3-7 cm.), 7-10 (13) mm. broad, not strongly inequilateral at the narrowly cuneate-excavate petiolulate base, the slender greenish costa medial, elevated beneath; veins barely evident beneath, very oblique, the basal ones 2 or 3 times forked, the others mostly once forked; sori intramarginal, terminal, transversely elongate (1-1.5 mm. long), solitary at base of marginal crenations, the oblong to narrowly lunate indusia parallel to the margin, affixed at broad base only, much smaller than the unaltered opposed marginal crenation; sporangia very numerous; spores triplanate, the annulus 10- or 11-articulate. Leaf tissue membrano-herbaceous, translucent, glabrous, dull light green above, paler beneath.

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²Proc. Biol. Soc. Washington 46: 143-144. 1933.

Type in the U. S. National Herbarium, no. 1,308,360, collected at Yerba Buena, northeast of San Isidro, Prov. Heredia, Costa Rica, altitude about 2,000 meters, in wet forest, February 22-28, 1926, by Paul C. Standley and Juvenal Valerio (no. 50039). Other specimens examined are as follows:

COSTA RICA: Navarrito, alt. 1,800 meters, *Lankester* 755. Mountains 5 miles south of Cartago, alt. 1,800 meters, on forest slope in rich humus, *Maxon* 514. Cerro de La Lajas, north of San Isidro, Prov. Heredia, alt. 2,000 meters or above, *Standley & Valerio* 51434. Without definite locality, *Cooper*.

PANAMA: Cordillera about Camp I, Holcomb's Trail (above El Boquete), Chiriquí, alt. 1,650-1,800 meters, *Killip* 5267.

The present species was long ago reported from Costa Rica by Baker³ as *Davallia Imrayana*, on the basis of the Cooper specimen above cited, and is presumably the plant listed more recently by Christ⁴ as *Saccoloma Imrayanum*. It is, in fact, closely related to *Ormoloma Imrayanum*, but differs consistently in several characters, which may be summarized as follows:

Stipes castaneous, sharply quadrangular, 1-1.3 mm. thick; pinnae 17-23, oblique, crenulate, 7-10 (13) mm. broad, not strongly inaequilateral at the narrowly cuneate-excavate base; sori 1-1.3 (1.5) mm. long.....**O. Standleyi.**

Stipes atropurpureous, subangular, 1.5-2.5 mm. thick; pinnae 5-15, spreading or laxly ascending, crenate, 13-20 mm. broad, strongly inaequilateral at base, rounded above, excavate-cuneate below; sori averaging much larger, often 2 mm. long.

O. Imrayanum.

³Journ. Bot. Brit. & For. 25: 24. 1887.

⁴Bull. Herb. Boiss. II. 4: 1099. 1904.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW LYCOPODIUM FROM WESTERN
GUATEMALA.¹

BY WILLIAM R. MAXON.

The present new species is one of an interesting collection of plants from western Guatemala, received recently from Dr. Alexander F. Skutch. It is dedicated with much pleasure to its discoverer, who although engaged primarily in a study of the nesting habits and life history of tropical American birds has found time nevertheless for a good deal of judicious botanical collecting.

***Lycopodium Skutchii* Maxon, sp. nov.**

Subg. *Urostachys*, sect. *Phlegmariurus*, ser. *Aqualupiana*. Planta pendula flaccida; partes vegetativae fertilibus paulum longiores, 3-6-bipartitae, caulibus tenuibus angulatis; folia distantia, obscure 8-faria, patentia, herbacea, integra, anguste ovata vel oblongo-lanceolata, longe acuminata, apiculata, basi subsessili anguste rotundata, costa marginibusque decurrentibus; partes fertiles 6-8-bipartitae, laxae, sporophyllis herbaceis subimbricatis e basi decurrente attenuata late ovatis, acuminatis, concavis, sporangia magna tegentibus.

A slender pendent epiphyte, 75 cm. long. Vegetative parts somewhat longer than the reproductive, unequally 3-6 times bipartite, the stem 1 mm. in diameter or less, angulate; leaves equal, distant, spreading, entire, obscurely 8-ranked, mostly dorsiventrally arranged by torsion at base, 8-11 mm. long, 2.5-3.5 mm. broad, narrowly ovate to oblong-lanceolate, long-acuminate at apex (the tip apiculate), narrowly rounded at base, subsessile, the costa and margins sharply long-decurrent; leaf-tissue wrinkled, thin-herbaceous, the immersed costa evident by transmitted light. Reproductive parts about 30 cm. long, lax, delicate, 6-8 times subequally bipartite, interruptedly fertile; sporophylls broadly ovate from a cuneate-decurrent base, 2-4 mm. long, about 1.5 mm. broad, acuminate, dark green, herbaceous, wrinkled, subcarinate, cucullate, embracing but not wholly concealing the sporangia, subimbricate only, those of the terminal strobiles closest but not congested; sporangia suborbicular, about 1.3 mm. in diameter, with a narrow, very deep sinus.

Type in the U. S. National Herbarium, no. 1,494,904, collected at Chichavac, Department of Chimaltenango, Guatemala, alt. 2,400-2,700 meters, from a mossy leaning tree trunk in humid dicotyledonous forest, Feb. 16, 1933, by Alexander F. Skutch (no. 243).

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Of the few tropical American species of its subgroup *L. Skutchii* need be compared only with the Antillean *L. aqualupianum* Spring and with the continental *L. callitrichifolium* Mett., of which *L. dichaeoides* Maxon² is probably a synonym. It differs notably from both in its long-acuminate leaves, which are borne in eight ranks rather than four. In sporophyll characters *L. Skutchii* resembles *L. aqualupianum*, but in that species the leaves are, at most, barely acute and the costa is plainly elevated throughout. It may be even more readily distinguished from *L. callitrichifolium*, in which the leaves are obtusely oblong-oval to broadly subspatulate and the sporophylls for the most part congested.

²Proc. Biol. Soc. Washington 18: 231. 1905.

PROCEEDINGS
OF THE
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A NEW SPECIES OF BRAZILIAN TERMITE, FEATURING AN INTERMEDIATE SOLDIER-WORKER INDIVIDUAL.

BY THOS. E. SNYDER,
Bureau of Entomology, U. S. Department of Agriculture.

"Intermediate" forms among the castes of termites are rather rare. It is true that intermediate forms among the colonizing reproductive adults, ranging from apterous to macropterous forms, are not uncommon; but when we consider the sterile soldier and worker castes, intermediates are very rare.

In colonies of *Kalotermes* (*K.*) *occidentis* Walker, of Arizona and western Mexico, all soldiers have wing pads or traces of wings, whereas among most other primitive termites wing pads are only occasionally found on soldiers. These soldiers are not fertile, but are merely reversions to the ancestral winged termite.

Where fertile soldier-like forms do occur, as in species of *Termopsis* of the Pacific Coast, the form of the soldier is not normal and they may be considered as intermediates between the ancestral winged sexual adult and the normal sterile soldier. None of the higher more specialized termites have soldiers with wing pads or fertile soldier-like forms and no fertile workers of any termite have as yet been discovered.

Among the termites classified between the primitive and the higher termites, such as those in our common genus *Reticulitermes* of North America and the north temperate regions of the world, a rare abnormality has been found. In the species *tibialis* Banks, of the western States, a male half worker, half soldier form was found over 15 years ago near Missoula, Mont. The head has the characteristic color of the soldier caste and is slightly longer than the head of the worker. The mandibles and labrum are typically worker-like, but are extended as in the soldier. This

form may merely be a worker of abnormal development or it may be an intermediate between the worker and soldier castes.

The soldier develops from a worker-like form to the soldier-like form during a quiescent stage, thereby in its ontogeny expressing the phylogeny of this caste, according to Emerson's theory. If something happens during this transformation, abnormalities or intermediates may result.

Recently a more definite intermediate soldier-worker form was found in a vial among a small collection of termites sent to me for identification. A description of this termite and of the intermediate follows.

***Nasutitermes* (N.) *myersi*, n. sp.**

Soldier.—Head castaneous brown, large, neither round nor oval; in profile, nearly a straight line slightly concave in middle and convex at base of nasus; with dense, fairly long hairs and longer bristles.

Nasus short and conical.

Mandibles vestigial, but plainly visible.

Antennae with 13 segments; third segment nearly as long as second and fourth together; fourth segment longer than second but shorter than fifth.

Pronotum lighter colored than head, yellow-brown; with dense, fairly long hairs and longer bristles; markedly roundedly emarginate in middle.

Abdomen yellow-brown; tergites with dense, fairly long hairs and a row of longer bristles at the base of each tergite.

An intermediate soldier-worker form has the color of the soldier, but has a shorter nasus than the soldier, and worker-like mandibles. Other differences are that this intermediate, like the worker, has 14 segments to the antennae, whereas the soldier has only 13. The third segment is merely longer than the second or third, whereas in the soldier the third segment is nearly as long as the second and third segments together. In general, this form is more worker-like than soldier-like. (See figs. 1 and 2.) In the measurements in the following table the minimum measurements are more normal than the maximum for the worker and the maximum more normal for the soldier.

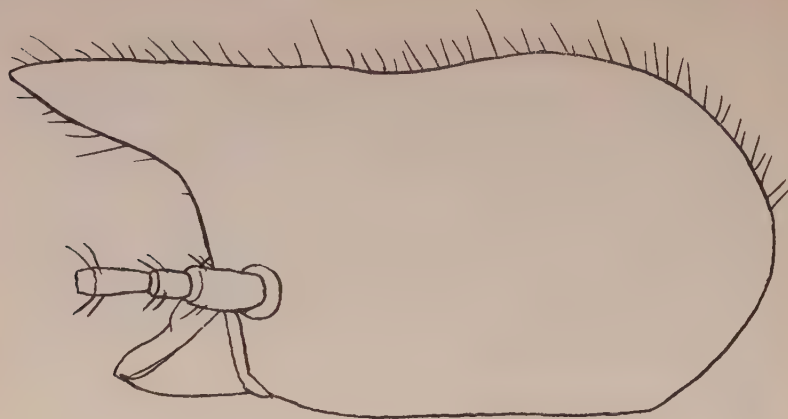
Measurements of the soldier in comparison with the worker and intermediate form:

Soldier		Worker	Intermediate
	mm.	mm.	mm.
Total length.....	5 - 6	5.3 - 6	5.1
Length of head with nasus.....	1.8 - 2.2		1.4
Length of head without nasus (to base of mandibles).....	1.1 - 1.4	1.1 - 1.4	1.1
Length of head without nasus (to tip of labrum).....	1.3 - 1.65	1.8 - 2.2	1.8
Length of nasus.....	0.65- 0.75		0.3
Length of pronotum.....	0.3 - 0.4	0.4	0.4
Length of hind tibia.....	1.5 - 1.8	1.6 - 1.7	1.6
Width of head.....	1.2 - 1.5	1.4 - 1.5	1.4
Width of pronotum.....	0.7 - 0.9	0.9 - 1	0.9

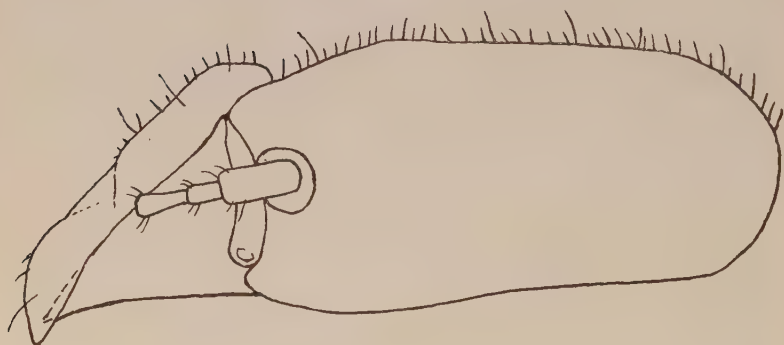
Comparison with other species.—The large, densely hairy head, color, and markedly emarginate pronotum distinguish this species from *macrocephalus* Silv., its closest relative.

Type locality.—Colinga-Uraricuera, Savannahs, Amazonas, Brazil. Described from six soldiers collected, with eight workers and one intermediate soldier-worker form, at the type locality by Dr. J. G. Myers in 1932, No. 3407. This termite is named in honor of the collector, entomologist of the Imperial Institute of Entomology.

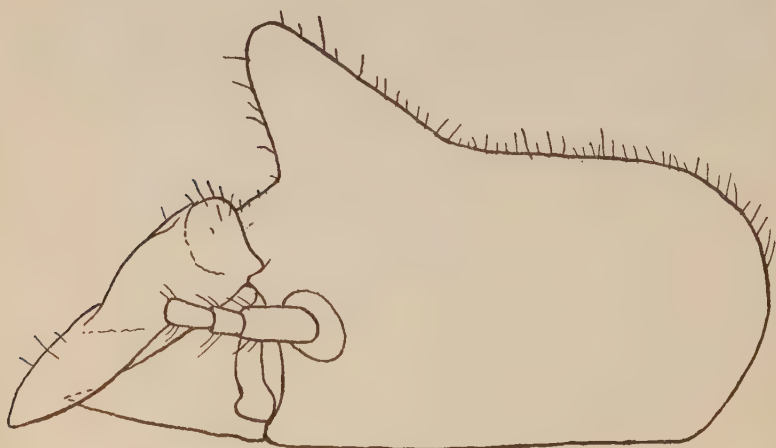
Cotypes, soldiers.—Cat. no. 49892, U. S. National Museum, in British Museum, and in the collection of Dr. A. E. Emerson of the University of Chicago.



a.



b.



c.

FIG. 1.—*Nasutitermes* (*N.*) *myersi* Snyder: *a* Soldier, lateral view of head; *b*, worker, lateral view of head; *c*, intermediate soldier-worker, lateral view of head. All enlarged 54 times. Drawn by H. B. Bradford.



a.



b.

FIG. 2.—*Nasutitermes* (*N.*) *myersi* Sny. Dorsal view of mandibles (*a*) of worker and soldier-worker and (*b*) soldier. Enlarged 54x.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THE TAXONOMY OF THE ANOPLURAN GENUS
PEDICULUS LINNAEUS.

BY H. E. EWING,
United States Bureau of Entomology.

In his revision of the American lice of the genus *Pediculus* (Ewing, 1926) the writer pointed out that those species occurring on American monkeys were distinct from those found on man. In fact he created for them a new subgenus, *Parapediculus*, and gave distinguishing characters for it. Since that time many specimens have been taken from American monkeys, through the cooperation of the National Zoological Park. A study of this additional material confirms the findings of the writer in his paper of 1926. It should be stated, however, that in one species observed (apparently an undescribed form) the lateral lobes of the pleural plates are very poorly developed and are present only on pleural plates IV and V.

Last year (1932) material from chimpanzees at the London Zoological Gardens was received. The first lot contained only three specimens, but the characters of these were so striking that a third subgenus was erected (Ewing, 1932) for the species they represented. This subgenus, *Paenipediculus*, was much farther removed from the typical subgenus than *Parapediculus*. The receipt of additional material of the type of *Paenipediculus*, *P. simiae*, and in particular the eggs and first nymphs included in the lot, have enabled the writer to elaborate somewhat on the characters of the subgenus *Paenipediculus*. Since the species of *Pediculus* from New World monkeys constitute a subgenus, the question may be asked: Do those from Old World apes constitute a subgenus?

The present writer is not in a good position to answer this question, as he has seen specimens of only one of the four species involved. However, a review of the literature indicates that only one of these three other species, *Pediculus schäffi* Fahrenholz (see Fahrenholz, 1915), belongs to *Paenipediculus*. This conclusion is reached notwithstanding the claims of Nuttall (1919). He stated, "We have recently encountered this louse

[*P. schäffi*] in the Denny Collection at Oxford . . ." and concluded as follows regarding it: "Judging from the author's figures and measurements he must have indeed examined very few specimens. The only indications he gives that may point to a new species are, (a), the presence of a blunt spur basally on coxa II in ♀ and larva, (b) the very prominent lateral protrusion of the last abdominal segments in a ♀, (c) the more tapering basal end of the egg; his further 'specific' characters may be dismissed as without significance." Nuttall finished his discussion of *Pediculus schäffi* with this statement: "On the evidence at hand, *P. schäffi* must be regarded provisionally as a race of *P. humanus*." It should be stated, however, that there are characters mentioned by Fahrenholz and others that are apparent in the figures he gives which clearly indicate that *Pediculus schäffi* belongs to *Paenipediculus*. As a matter of fact, only one of the six characters given in the original diagnosis of *Paenipediculus* is discussed by Nuttall.

The other two ape-infesting species of *Pediculus* are *P. assimilis* Fahrenholz and *P. friedenthali* Fahrenholz. According to the descriptions and figures given by Fahrenholz these species do not belong to *Paenipediculus*. Could they have been stragglers on their hosts, gibbons, from some other primates? In order to answer this point the writer has searched several scores of study skins representing several species of gibbons without finding as much as a single egg or louse specimen. It would appear to some that this would indicate either that gibbons were not the natural hosts of these species or that they were rare in nature. The writer would hesitate, however, to draw such conclusions.

When the writer described the type of *Paenipediculus*, *P. simiae*, there was little assurance that it actually had the chimpanzee as a natural host. In order to learn more about the conditions of the host previous to the taking of the lice, inquiry was made of Dr. B. V. Wigglesworth, the sender of the first lot of material, to get any data he could supply. He not only obtained such information but forwarded to me the additional material (already mentioned), which was collected by Colonel A. E. Hamerton at the London Zoological Gardens, together with the following note from Colonel Hamerton, who collected the first lot of material:

"The first lice I sent to you were taken from a chimpanzee 'Andrew' that was brought to England from West Africa (Gold Coast) early in the year and was deposited in the 'Zoo' here last July. The lice were found on it a few days after arrival—and they have spread to 2 other chimpanzees that shared its den for a time. I send to you herewith some living and dead specimens from the 'Chimps' that were infected from 'Andrew.' I have not been able to find them on any other primates—though I have not searched all the representatives of this order in our collection. I am unable to say that the chimpanzee is the natural host of the louse. The 2 gorillas will not permit any one to handle them so it is not possible to say whether they harbor *Phthirus gorillae*, but they show no signs of lousiness."

Thus the indications are that the host from which the type of *Paenipediculus* was taken was infested in nature, and that the louse described did in fact belong to the chimpanzee.

Other facts, also, have been brought to bear on the host problem which show conclusively that the louse described is in fact a chimpanzee louse. They are here given:

Several years ago the writer collected eggs from chimpanzee skins in the United States National Museum. He even obtained the fully formed first nymphs from some of these eggs, but because of the lack of more mature individuals, and because little was known at that time in regard to the history of the host individuals from which the eggs were taken, no description of them was made. After publishing the description of *Paenipediculus simiae* the writer began to wonder if these eggs could possibly be those of the described species, but could come to no conclusion, as no eggs of *Paenipediculus simiae* were available for comparison.

Fortunately, however, in this second lot of material sent from the London Zoological Gardens there were some eggs. These were mounted and studied. They proved to be identical with those I had taken previously from chimpanzee skins.

An investigation as to the source of the egg material obtained from the study skins at the National Museum shows that four of the five lots taken came each from the skin of a different individual chimpanzee killed in nature,¹ and one came from a young chimpanzee that had been kept in captivity for about a year in Africa. Thus we have the desired proof that *Paenipediculus simiae* has the chimpanzee as a natural host.

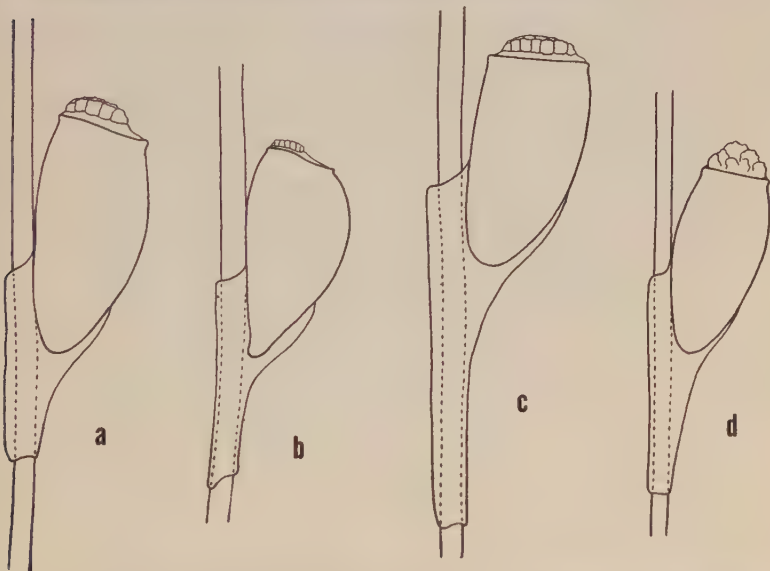


FIG. 1.—Eggs of two man-infesting and two ape-infesting louse species, all drawn to the same scale; a, *Pediculus humanus*; b, *Pediculus* (*Paenipediculus*) *simiae*; c, *Phthirus gorillae*; d, *Phthirus pubis*.

¹This information was obtained from the records of the collector of the chimpanzee skins, C. R. Aschemeier. Mr. Aschemeier, who is a taxidermist in the United States National Museum, also was interviewed.

Paenipediculus was described as a subgenus of *Pediculus* and should be regarded as such. However, an examination of further material representing eggs, first nymphs, other nymphs, and several females necessitates a revision of the generic diagnosis. In the original description of the subgenus it was stated that the first three pairs of pleural plates were absent. However, by clearing a female specimen of the second lot of material with potassium hydroxide and staining in acid fuchsin it was found that each of these pleural plates was represented by a ring of chitin. These vestigial pleural plates do not show up in unstained specimens, as the chitin has little or no natural pigment.

An examination of the legs of the first nymphs shows that the first tarsal claws are long, sharp, and slender; while the second and third tarsal claws are stout and have their tips rounded (Fig. 2, c). This marked difference in the tarsal claws suggests a condition found in the first nymphs of *Phthirus* (Fig. 2, a and b) and possibly indicates a phylogenetic relationship between the Pediculidae and Phthiridae.

In order to show more clearly the differences between the first nymphal instars of some related primate-infesting lice a key is here given to the two species occurring on man, the one species known from the gorilla, and the type of *Paenipediculus* from the chimpanzee.

1. Tarsi and tarsal claws of all the legs of the same size and shape.....
Pediculus humanus Linnaeus.
Tarsi of anterior legs more slender than the others, tarsal claws of anterior legs much more slender and much sharper than the tarsal claws of the other legs.....2
2. Tarsal claws II and III rounded at their tips, simple, without teeth.....*Paenipediculus simiae* Ewing.
Tarsal claws II and III pointed at their tips, and provided with teeth.....3
3. Tarsal claw I longer than II and III, with vestigial teeth; tarsal claws II and III very short, but slightly longer than broad and with teeth poorly formed; spine on tibial thumbs II and III stout, conspicuous, and more than one-third as long as claws II and III.....*Phthirus gorillae* Ewing.
Tarsal claw I not longer than II and III, provided with distinct teeth; tarsal claws II and III slender, over three times as long as broad and each provided with large, tuberclelike teeth; spine on tibial thumbs II and III very short and inconspicuous.....*Phthirus pubis* (Linnaeus.).

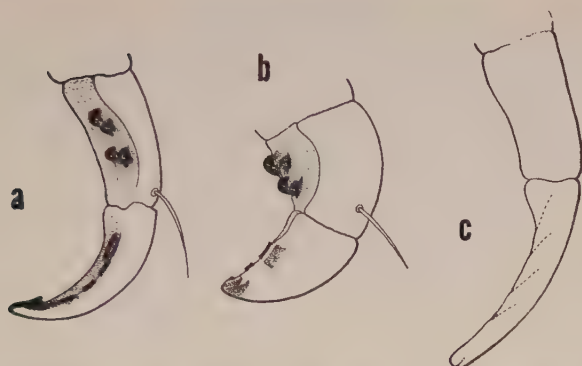


FIG. 2.—Tarsus III, from below, of first nymphal instar of three primate-infesting lice; a, *Phthirus pubis*; b, *Phthirus gorillae*; c, *Pediculus* (*Paenipediculus*) *simiae*. All drawings equally enlarged.

The characters of the eggs (Fig. 1) and of the first nymphs of *Pediculus* certainly have a subgeneric significance. This is particularly true of *Paenipediculus*. If we insert them in a key to the subgenera of *Pediculus* along with the adult characters we get the following:

KEY TO THE SUBGENERA OF PEDICULUS.

1. Egg oval, or but very slightly pointed at the base, its greatest length more than twice its greatest diameter. First tarsi and first tarsal claws of first nymph the same as the other tarsi and tarsal claws. Adult females with first pair of legs similar to the others; first three pairs of pleural plates well developed; body clothed with setae.....2
- Egg with base cone shaped, tapering, and middle part inflated, its greatest length about twice its greatest diameter. First tarsi and first tarsal claws of first nymph more slender than the others. Adult females with first pair of legs more slender than the others; first three pairs of pleural plates greatly reduced, being represented by small chitinous rings; body practically naked.....*Paenipediculus* Ewing.
2. Egg frequently somewhat tapering and curved at the base toward attached hair, cement cup with a long extension on hair which may exceed the length of the egg itself. Adults with characters as follows: Some of pleural plates provided with lateral lobes; body setae rather inconspicuous, setiform, and nearly all of them arranged in transverse rows; thoracic spiracles not conspicuous; chitinous parts heavily pigmented. Living on American monkeys.....*Parapediculus* Ewing.
- Egg oval or suboval and seldom curved at the base toward attached hair, about two and a half times as long as broad, cement cup

with short extension on hair which seldom exceeds one-half the length of the egg itself. Adults with characters as follows: None of pleural plates with lateral lobes; body setae conspicuous, frequently peglike, seldom over one-half of them arranged in transverse rows; thoracic spiracles large, conspicuous; chitinous parts frequently poorly pigmented. Living on man and gibbons.....*Pediculus* Linnaeus.

The different varieties of *Pediculus humanus* Linnaeus and apparently the two species described by Fahrenholz from gibbons belong to the typical subgenus. All of the American monkey-infesting species are included in *Parapediculus*, while the two lice reported from the chimpanzee belong to *Paenipediculus*. The louse of the gorilla is not a *Pediculus*. The characters of the nymph (first nymph) are typical of *Phthirus*. The valid species and varieties of *Pediculus*, together with their type hosts, are here given.

A LIST OF THE KNOWN SPECIES AND VARIETIES OF PEDICULUS.

SUBGENUS PEDICULUS LINNAEUS.

- P. humanus humanus* Linnaeus, from white race of man.
- P. humanus corporis* Degeer, from white race of man.
- P. humanus nigritarum* Fabricius, from black race of man.
- P. humanus americanus* Ewing, from red race of man.
- P. humanus angustus* Fahrenholz, from yellow race of man.
- P. assimilis* Fahrenholz, from gibbon, *Hylobates syndactylus*.
- P. friedenthali* Fahrenholz, from gibbon, *Hylobates mülleri*.

SUBGENUS PARAPEDICULUS EWING.

- P. lobatus* Fahrenholz, from Schlegel's spider monkey, *Ateles pan.*
- P. atelophilus* Ewing, from grey spider monkey, *Ateles geoffroyi*.
- P. consobrinus* Piaget, from a spider monkey, *Ateles paniscus*.
- P. chapini* Ewing, from a spider monkey, *Ateles ater*.

SUBGENUS PAENIPEDICULUS EWING.

- P. schäffi* Fahrenholz, from chimpanzee, *Pan troglodytes*.
- P. simiae* Ewing, from chimpanzee, *Pan* sp.

A long list of synonyms might here be added, but it is not intended to go into the matter of synonymy in this paper. Nuttall (1919) has given a list of synonyms. It should be stated, however, that a more careful study of some of these so-called synonyms may show that they represent good races or subspecies. By all odds the most important taxonomic character in *Pediculus* is the shape of the pleural plates. These have not been critically studied in some of the Old World species. The position and size of the spiracles is another important character that has attracted but little attention from workers in the past.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

NEW SPECIES OF SKINKS FROM MEXICO.

BY EDWARD H. TAYLOR.

Among the collections of the United States National Museum are two small skinks of the genus *Eumeces* which appear to be unnamed. Due to the courtesy of Dr. Leonhard Stejneger and Miss Doris Cochran, both of the Museum, I have been given the privilege of describing these interesting novelties.

Both forms are from the western part of Mexico; one, *Eumeces parvulus*, from Nayarit and Sinaloa; the other, *Eumeces parviauriculatus*, from Sonora. This territory is much less known than the plateau region, and it is highly probable that other interesting species await discovery in this part of Mexico.

Eumeces parvulus, sp. nov.

Type.—Catalogue No. 56903, United States National Museum. Collected, Tepic, Nayarit, Mexico, April 10, 1910.

Diagnosis.—A small species, having a dorsolateral line beginning on rostral, passing back on side of head, and neck, and disappearing about the middle of the back; a lateral light line from rostral to ear, following the lower edge of labials; no median light line or bifurcating lines on head; four supraoculars; no postnasal; one postmental; parietals enclose interparietal; frontonasal touches frontal; a relatively very large primary temporal, larger than lower secondary temporal, and in contact with it. Twenty-four scale rows about the middle of the body; postgenial large, bordered on inner edge by a scale wider than long.

Description of type.—Part of rostral appearing on anterior tip of snout small, separated from frontonasal by the paired supranasals; frontonasal broader than long, angular anteriorly, rounded posteriorly, forming a considerable suture with the frontal, and in contact laterally with the anterior loreal; frontal more than a third longer than its distance from tip of snout, truncate anteriorly, rounded behind, constricted at a point about one-third the distance from the posterior edge, broadly in contact with the three anterior supraoculars; frontoparietals distinctly rectangular, making a median suture less than one-third of their length; interparietal rather

small, broadly enclosed by the parietals; first pair of nuchals very large, nearly twice the depth of the second pair; nasal small, distinctly divided; first loreal distinctly higher, but narrower than the second, in contact with first and second labials; two presuboculars; six superciliaries, the first nearly twice the area of second; four supraoculars, the third the widest; first touching the prefrontal; three postsuboculars; the single primary temporal almost as large as the upper secondary temporal, and much the same shape; the lower secondary temporal somewhat fan-shaped, smaller than the primary temporal. Seven upper labials, four preceding the subocular, the first higher than the three following and equally as high as subocular; the seventh upper labial largest, followed by a pair of postlabial scales

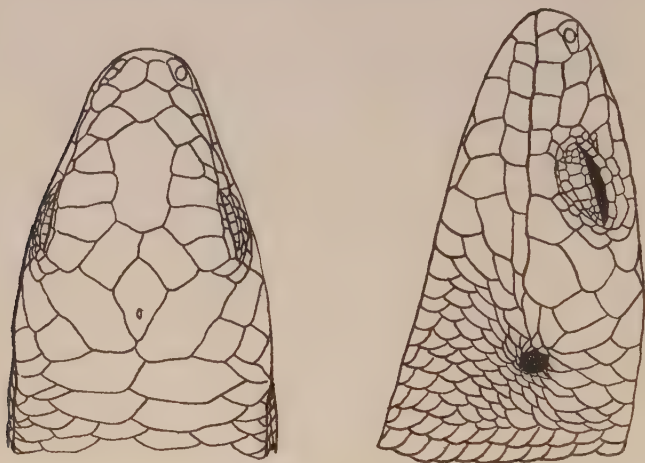


FIG. 1.—*Eumeces parvulus*, sp. nov. U. S. N. M. No. 56903. Type. Head, dorsal and lateral views. Actual head length, 9 mm.

of which the lower is narrow, longer than the upper; these are separated from the ear lobules by two or three very small scales; seventh labial largest, not in contact with the upper secondary temporal and separated from ear by a distance less than its length; six lower labials; mental large, forming a longer labial border than rostral; a postmental, and three pairs of chin-shields, the latter followed by an elongate postgenial scale which is bordered on anterior inner edge by a scale much broader than long; diameter of eye about equal to distance from nostril, but distinctly shorter than distance to ear; the median palpebral scales in direct contact with the superciliaries; lower eyelid with a series of four enlarged opaque or semi-transparent scales, separated from the subocular by two or three scale rows, the lowest largest; ear moderate, surrounded by about 14 to 15 scales; the line separating the post-auricular series from the lateral nuchal series vertical and separated from ear by five scale rows; scale rows around neck behind ear, 27; about constricted part of neck, 24; about body in axillary region, 31; about middle of body, 24; the intercalated axillary series are all

dropped at a distance from axilla a little greater than length of the foreleg. The scales on back are rather small, rounded behind, the median rows not larger than other dorsals, but dorsals are all larger than laterals or ventrals; limbs short but rather stout; palm bearing a few enlarged rounded scales, not distinctive, with several smaller granules; foot without enlarged scales save about heel; the lamella formula of forefoot, 4 : 6 : 9 : 10 : 5; hind foot, 3 : 7 : 9 : 13 : 5. The two median preanal scales somewhat enlarged; three small lateral preanal scales on each side, the outer of which overlap the inner; subcaudal scales slightly wider than adjoining scales; 63 scales in row from parietals to above anus.

Color.—(In alcohol.) Above brownish olive; dorsolateral light line beginning on snout, passes back along head and follows first the third, then fourth scale rows; it disappears about middle of body; the dorsal ground color is eight rows wide on middle of body; a brown lateral stripe from the rostral passes back along the side of head and body where it shows dimly, covering two scale rows; a lateral line begins on the rostral but terminates at the ear after passing along the lower edges of the labials; chin and lower labials cream; the remainder of the lower surfaces grayish; preanals and the under side of limbs lighter; the grayish color of belly borders the brown lateral stripe.

Measurements of the type and paratypes of Eumeces parvulus, sp. nov.

	U. S. N. M.	U. S. N. M.	U. S. N. M.
Number	56903	51395	47667
Snout to vent.....	51	37	28.5
Snout to foreleg.....	14	13	9
Snout to ear.....	8.3	8	6.3
Snout to eye.....	3.2	3	2.2
Head, greatest width.....	7	5	4.5
Head length.....	9	6	6
Greatest body width.....	9	7	4.6
Axilla to groin.....	32	20	15
Postanal tail width.....	5	3.6	2.7
Foreleg.....	9	8	6.3
Hindleg.....	14	12	8
Longest toe.....	6	3.6	2.2

(Tail either broken or incomplete in all specimens. No. 51395 measures 50 mm. with the latter part missing, but regeneration begun.)

Variation.—Two additional specimens, No. 51395 U. S. N. M. from Miniman, Nayarit, Mexico (Coll. J. C. Thompson) and a second, No. 47667 U. S. N. M. collected at Plumosas, Sinaloa (Coll. Nelson and Goldman) are at hand for comparison.

The first of the two shows the following variations in scalation: 62 instead of 63 scales from head to above vent; about 15 scales about ear; there are 14 instead of 13 lamellæ under longest toe; the adpressed limbs are very narrowly separated when adpressed while in the larger specimen they are

separated by 8 millimeters. The color of this form is darker, appearing brownish above with the dorsolateral lines cream and well differentiated to about midway on body. The lateral stripe is difficult to differentiate from body color; chin and throat cream color; the color of the abdomen appears somewhat in darker and lighter lines, a character also visible but dim in the type; under side of tail lighter than abdomen, the median part with a lighter streak; regenerated tip on tail, cream.

No. 47667 U. S. N. M. from Plumosas, Sinaloa, Mexico, shows a number of abnormal peculiarities. The frontonasal and prefrontals are fused into a single scale and this separated from the frontal by a partly obliterated suture; the posterior constriction of the frontal is very slight; the enclosed interparietal is as broad as long; the primary temporal is as large as upper secondary but both are slenderer in type; the head appears to be proportionally wider; there appears to be only 22 scale rows (the specimen has been injured, and it is difficult to make an accurate count at middle of body); other scales and markings are similar, generally, to type, the line behind ear being wholly absent; the color above is grayish brown, the lateral brown line very distinct.

If the character of the fused frontonasal and prefrontals were not abnormal, it would be necessary to recognize this as a distinct species. However, I strongly suspect it is abnormal and for the time being it will be placed under this species. Similar anomalies have been observed in specimens of several other species.

Remarks.—The relationship of the species is not clear, and appears to show more characters in common with the newly described form, *Eumeces parviauriculatus*, as I have suggested under that species; and possibly also to a newly described form, *Eumeces ochoterene* Taylor, from the high mountains of Guerrero, Mexico.

***Eumeces parviauriculatus*, sp. nov.**

Type.—Catalog, No. 47536 United States National Museum. Collected near Alamos, Sonora, Mexico, Jan. 5, 1899, by E. A. Goldman. Field No. 1134. Male, apparently young adult.

Diagnosis.—A small slender species, with a distinct dorsolateral line beginning on rostral, and continuing posteriorly on sides, losing itself on the back; a lateral line begins on rostral and continues across labials and ear to forearm where it is lost; one postmental; no postnasal; parietals not enclosing interparietal; four supraoculars, three touching frontal; seventh labial largest of series but relatively small, scarcely larger than sixth, and separated from the extremely small auricular opening by a distance greater than its length; primary temporal large in contact with the very large lower secondary; postlabial scales overlap edge of auricular opening; 20 scale rows around body; subcaudals somewhat enlarged; two nuchals; small tubercular scales behind and above the insertion of forearm.

Description of type.—The part of the rostral appearing above, very small; separated from the frontonasal by the pair of supranasals which form a median suture; frontonasal much broader than long, pointed anteriorly,

rounded posteriorly, touching anterior loreal; prefrontals small, widely separated, their sutures with frontal equal to that with the frontonasal; also forming sutures with two loreals, the first superciliary and first supraocular; frontal broad and elongate, much longer than its distance to the end of the snout, and distinctly constricted at a point about one-third the distance from the posterior end; frontoparietals very much larger, at least double the size of the prefrontals, and form a moderately long median suture; interparietal wide and short, not enclosed by the parietals; a pair of well developed nuchals followed by a second pair (scales broken on left side); nasal small, the nostril directed strongly forward and downwards; two loreals, the anterior very high, touching first and second labials; second loreal somewhat rectangular, touching the second and third labials; four supraoculars, the anterior nearly triangular, forming a small suture with prefrontal, the third widest forming an angular wedge between the frontal and frontoparietal (on right side due to an injury apparently, the

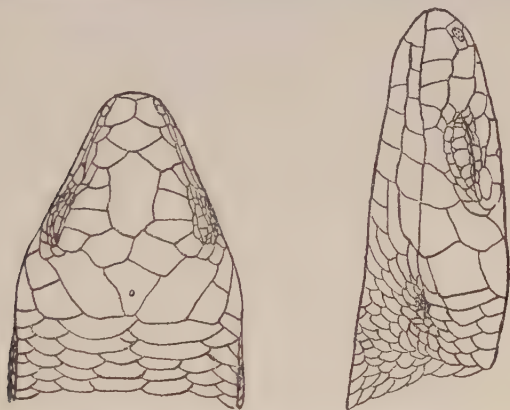


FIG. 2.—*Eumeces parviauriculatus*, sp. nov. U. S. N. M. No. 47536. Type Head, dorsal and lateral views. Actual head length, 7 mm.

two first supraoculars are partly fused and these with the first superciliary); five superciliaries, the first not greatly larger than the second; two pre-suboculars, three postsuboculars; primary temporal large (larger on left side than right side), larger than seventh labial, broadly in contact with the lower secondary temporal; the upper secondary temporal largest, smaller on left than right side; the lower secondary nearly square, forming an elongate suture below with a very narrow elongate postlabial; second postlabial separates the two scales from the auricular opening and overlaps its edges; the tertiary temporal small, separated from auricular opening by a scale; seven labials, last largest, but not greatly larger than sixth; the subocular very low, distinctly lower than first labial; the first much higher than three succeeding; six lower labials; postmental large, single; three pairs of chinshields, the first pair broadly in contact, second separated by a single scale; last pair followed by an elongate postgenial bordered

internally by an enlarged scale much wider than long; the larger scales in front of and above auricular opening, overhang it; no lobules can be observed; about ten scales about border of ear; eye small, as long as or slightly longer than its distance from nostril much less than its distance from ear; the line dividing the postauricular scale series from the lateral nuchal series curves strongly forward; the scales of the median row following nuchals much widened; on body the median rows of scales are somewhat wider than adjoining series, the posterior edges not strongly curved, practically parallel with their anterior edge. Scale rows behind ear, 25; on constricted portion of neck, 23; behind arm, 26; around middle, 20; about base of tail, 15; there are 63 scales in a row from parietal to above anus; the scales on sides and abdomen are smaller than the median dorsals; the extra axillary rows are dropped at a point less than once and half length of forearm from axilla; behind arm and continuing above arm to point of anterior insertion are several rows of small granular flattened, non-imbricating scales; a median pair of preanal scales, much enlarged, and two lateral scales on each side, the outer of which overlap the inner; a lateral postanal scale elongate but not otherwise differentiated; subcaudal scales widened, at least two to two and one-half times as wide as deep, more than a half wider than adjoining scale rows; limbs slender, delicate, very widely separated when adpressed; a few rounded enlarged tubercles on palm separated by the series at base of digits by several small granular tubercles; a few enlarged granules on sole near enlarged scutes bordering heel, others on sole small; the lamella formula for hand is: 3 : 7 : 7 : 8 : 5; for the foot, 4 : 7 : 10 : 11 : 7.

Color.—(In alcohol. Probably much discolored.) Above dark slaty brown, the scales appearing darker on their sutures, forming indistinct dotted darker lines; a distinct light colored dorsolateral line from rostral back along sides on the third scale row, which is lost on the posterior part of back; a lateral line beginning on labials continues back, involving ear, to forearm; chin, lower labials, and breast, cream; belly dark. A darker lateral band, which passes from the side of head, through eyes, and along the side, is difficult to distinguish laterally, but is continued on tail; the scales show large central brown areas with lighter edges.

Measurements of the type of Eumeces parviauriculatus, sp. nov.

Snout to vent.....	47
Snout to foreleg.....	14
Snout to ear.....	7.9
Snout to eye.....	3
Head width, greatest.....	6
Head length from nuchals.....	7
Greatest body width.....	6
Axilla to groin.....	28
Postanal tail width.....	4.3
Foreleg.....	7.3
Hindleg.....	10.6
Longest toe.....	4

Remarks.—Only a single specimen, the type, has been examined. The type is in poor condition; many of the scales have slipped, and the abdomen is somewhat softened. The viscera have been removed. The tail is present, but is broken into two pieces; the tip is regenerated; the fore feet have been dried. Despite this, none of the essential characters are obscured.

The relationship of the form is not clear. It is probably a degenerate form and may be distantly related to *Eumeces parvulus* described in this paper. It differs in having a smaller ear opening overlapped by the scales on its anterior border; the character of the temporals and the character of the scales at the insertion of arm and the unenclosed parietal; the character of the frontal and the relationships with the supraoculars; the wide separation of the seventh labial from the ear and the different shape, relative size and character of the scales surrounding the body.

It is probably totally unrelated to the recently described *Eumeces dicei* Ruthven and Gage. This form, judging by the character of the temporals, belongs to another section of the genus.

The known *Eumeces* fauna of Sonora is indeed meager, this being the only specimen I am aware of, certainly from this large state. *Eumeces callicephalus* Bocourt and *Eumeces humilis* Boulenger and some form *Eumeces brevirostris* Günther may be expected to occur. Its relationship appears to be with none of these forms.

PROCEEDINGS
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PRELIMINARY DESCRIPTIONS OF NINE NEW
SPECIES OF OXYSTOMATOUS AND
ALLIED CRABS.

BY MARY J. RATHBUN.¹

Fuller descriptions of the following species will appear in a Bulletin of the United States National Museum.

FAMILY CALAPPIDAE.

Calappa saussurei tortugae, subsp. nov.

Type.—Male, U. S. National Museum Cat. No. 66382, south of Tortugas, Florida. Collected by W. L. Schmitt. Differs from typical *saussurei* as follows: Surface of carapace finely granulate; tubercles low, arcuate, not acute. Specimens larger and wider than those of the typical form, and posterior margin between the terminal teeth more convex. Length of carapace 33.9, width at middle 39.8 mm.

Hepatella peruviana, sp. nov.

Hepatella amica Rathbun, not Smith, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 552, pl. 50, fig. 5.

Type.—Female, U. S. National Museum Cat. No. 40451, Bay of Sechura, west of Macaballa, about 5 fathoms, Apr. 8, 1907. Collected by R. E. Coker.

Carapace narrow, edge thin, front more produced and orbits more dorsal than in *amica*. Protuberances small, one oblong and granulate on each branchial region; one round on cardiac region and crossed by a transverse line of granules; 3 small, granulate, on gastric region, the median behind the lateral pair. Antero-lateral teeth regular, subtruncate; a broad tooth near anterior end of postero-lateral margin, a thicker, more prominent tooth at end of posterior margin. Length of carapace 18.2, width 20 mm.

FAMILY LEUCOSIIDAE.

Ebalia hancocki, sp. nov.

Type.—Female, U. S. National Museum Cat. No. 67988, off Charles

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Island, Galapagos Islands, lat. 1° 03' 30" S., long. 90° 17' 30" W., 36 fathoms, Feb. 5, 1933, station 55, Hancock Galapagos Expedition.

Near *E. magdalenensis*. Carapace broader than long. Surface covered with large globular granules, in large part separated. Frontal margin divided by a short impressed line into two shallow blunt teeth. Branchial elevation larger than in *magdalenensis*; its anterior, highest portion has finer, closer granules. Antero-lateral depression restricted by an hepatic elevation; behind this the antero-lateral margin is plainly indicated; just below it, a rectangular pterygostomial tooth, behind which is the widest part of the carapace, the beginning of the lateral margin of the branchial region which is bordered with flat spinules. Posterior lobes broad, arcuate and very shallow. A triangular tooth on upper base of movable finger. Length of carapace 7.2, width 8 mm.

***Persephona punctata aquilonaris*, subsp. nov.**

Persephona punctata Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. 7, 1859, p. 70 (part: Florida and South Carolina; not synonymy).

Type.—Male, U. S. National Museum Cat. No. 62057, St. Augustine, Florida. Collected by Robert Ranson.

Differs from typical *P. punctata* as follows: Carapace more convex; granulation coarser, plainly visible to naked eye, especially prominent on lateral margins. Subhepatic angle small, subacute, tipped with a granule. Front narrower and more produced. Posterior margin narrower, the 3 posterior spines slenderer. Length of carapace on median line to tip of spine 48, to base of spine 45.3, width 42 mm.

***Persephona finneganae*, sp. nov.**

Persephona lichtensteini Finnegan, Jour. Linn. Soc. London, Zool., vol. 37, 1931, p. 614, text-fig. 2; not *P. lichtensteini* Leach, 1817.

Type.—Male, U. S. National Museum Cat. No. 67989, São Sebastião, Brazil. Gift of Museu Paulista.

Seven strong spines, one hepatic (paired) and one at widest part of carapace (paired); of the posterior spines the median reaches half again as far back as the lateral pair. Carapace subglobular, posterior half narrower than anterior. Surface covered with coarse, separated granules on a ground of fine, close granulation interspersed with punctae. Intestinal region partially defined by shallow furrows; two pairs of short thumb-nail, almost longitudinal indentations just behind the middle of carapace. The hepatic spines are more triangular than the branchial and of subequal length; between them, but nearer the branchial spine there is a low, blunt tooth; of the posterior spines the pair on the posterior border are a little longer than the hepatic spines; the median or intestinal spine is about 1½ times the length of the posterior lateral spines and forms a right angle with them. Entire length of carapace 37, without spine 34, entire breadth 37, without spines 32.2 mm.

FAMILY DORIPPIDAE.

Ethusina faxonii, sp. nov.

Ethusina challengerii? Faxon, Mem. Mus. Comp. Zool., vol. 18, 1895, p. 36; not *Ethusa* (*Ethusina*) *challengerii* Miers, Challenger Rept., Zool., vol. 17, 1886, p. 331, pl. 28, fig. 2-2c.

Type.—Female, Museum of Comparative Zoölogy Cat. No. 4502, S. of Gulf of Tehuantepec, lat. $10^{\circ} 14' 00''$ N., long. $96^{\circ} 28' 00''$ W., 2232 fathoms, gn. M., 35.8° F., Apr. 8, 1891, station 3414, *Albatross*.

Carapace very convex longitudinally and transversely. Frontal teeth shallow, middle pair broad, obtuse, separated by a broad V-shaped sinus, slightly rounded at base; outer pair of teeth small, triangular, shorter than median teeth. Exorbital tooth minute. Chelae slenderer than in *challengerii*, upper and lower margins subparallel, lower margin concave until near proximal end of manus. Fingers longer than in the related species, slightly wavy on inner margin. Third and fourth ambulatories slenderer than in *challengerii*. Abdomen of female broader in distal half, inner distal angle of ischium of outer maxillipeds more salient and merus more pear-shaped. Length and breadth of carapace 12.5 mm.

Clythrocerus decorus, sp. nov.

Clythrocerus, sp., Rathbun, Harriman Alaska Exped., vol. 10, 1904, p. 169, pl. 9, fig. 5.

Type.—U. S. National Museum Cat. No. 67435, off Santa Rosa Island, California, 38-45 fathoms, Apr. 15, 1904, station 4431, *Albatross*.

Two lateral teeth or spines, the distance between them less than between the foremost tooth and the orbital tooth. Carapace depressed, regions plainly marked, coarsely granulate, granules disposed in groups on the regions, furrows smooth. Front divided into two broad teeth which terminate in blunt divergent spines with parallel sides. Orbit with a triangular notch above and an outer subacute spine. Two stout denticulate teeth or spines on antero-lateral margin, the interspace shorter than that between the anterior one and the orbital spine. Lateral margin finely denticulate. Antennules fitting snugly in their sockets; peduncle of antennae tipped with a tubercle. Two tubercles below orbit. Endognath of outer maxilliped with two longitudinal grooves. Length and breadth of carapace 6 mm.

FAMILY DROMIIDAE.

Hypoconcha spinosissima, sp. nov.

Type.—Female, U. S. National Museum Cat. No. 55957, off Cape Hatteras, North Carolina, 49 fathoms, Oct. 17, 1885, station 2596, *Albatross*.

Carapace short pubescent above, hairy all over below, especially in the old; front subtruncate between antennae; a short wide median fissure is followed by a shallow furrow; antero-lateral margin sinuous. Ventral surface granulate, granules sparser on carapace than on appendages. Spines are distributed as follows: 5 or 6 at angle of margin of the deflexed

front; a longer spine where the epistome joins the front; a strong, curved spine above and below the middle of the orbit; 1 or 2 slender spines on a protuberance of the carapace in horizontal line with buccal angle; 3 spines on carpus of cheliped; 9 or 10 on outer surface of manus, irregularly disposed in 3 rows; a spine on coxa and ischium of cheliped and first ambulatory. A row of short spines and tubercles on border of epistome; a row of 6 or 7 very slender curved spines at outer angle of merus of maxilliped; an elongate swelling lies just inside and parallel to the distal margin of said merus. Length of carapace 16.6, width 18 mm.

FAMILY RANINIDAE.

***Raninoides louisianensis*, sp. nov.**

Type.—U. S. National Museum Cat. No. 9659, east of Mississippi Delta, 68 fathoms, station 2378, *Albatross*.

Near *R. loevis*; differs as follows: All sinuses of front longitudinal, shorter than in *loevis* and continued backward by a very short gutter. Tooth next to submedian tooth with nearly straight margin, not distinctly angled; the slender, outer orbital tooth nearly straight. Hepatic tooth longer and straight instead of curved. No spine at extremity of merus of cheliped. Subterminal spine of manus nearer the end of upper margin; lower margin with more numerous (5 or 6) and slenderer spines, with a few minute spinules interspersed. Dactyls of first and second ambulatories shorter and broader, of third leg larger and straighter on outer margin. A slender sharp spine near distal end of ischium of second leg of male. Length of carapace 35.6, width at middle 18.4 mm.

PROCEEDINGS
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CRITICAL NOTES ON AMERICAN VULTURES.

BY HERBERT FRIEDMANN.¹

The following observations and notes were made while studying the Cathartidae in connection with the continuation of Ridgway's unfinished work, *The Birds of North and Middle America*.

1. The Genus *Coragyps*.

Current literature treats with this monotypic genus as comprising two races, the North American black vulture, *C. atratus atratus* (Bechstein) and the South American form, *C. atratus foetens* (Lichtenstein). The latter subspecies is said to be smaller, but otherwise not different, from the nominate race. However, there has been considerable difference of opinion among investigators as to whether or not the two forms were constant in their differences. Thus, Todd (Ann. Carnegie Mus., xiv, 1922, 142) treated the black vulture binomially; Wetmore (Bull. 133, U. S. Nat. Mus., 1926, 90) called his South American birds *C. atratus foetens*, but wrote that in a limited series he was unable to find any sharply trenchant difference between northern and southern birds.

Through the kindness of Mr. John T. Zimmer, of the American Museum of Natural History, I have been able to borrow a series of South American birds to amplify the material in Washington. All in all I have seen 10 specimens of *foetens* (from Argentina, Chile, Ecuador, and Brazil) and twice that many of typical *atratus*. My findings are as follows: South American birds have wings ranging from 412-432 mm. (one Chilean specimen 405 mm.); North American birds measure, in this dimension, from 415-454 mm. The average of the South American birds is 421 mm., that of the North American series 432.8 mm. It may be seen that although North American birds may achieve considerably greater proportions than South American specimens, yet, practically all (8 out of 10) of the latter group may be matched by North American birds. In other words, if we accept size as a valid criterion of race, we can identify none of the South American birds by this means, and only the larger examples from North America. Not only are the variational limits of *foetens* almost wholly

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contained within those of *atratus*, but the difference between the averages of the two is less than 3% of their size. Therefore, I conclude that we are not justified in separating *foetens* from *atratus* and the name of the black vulture throughout its entire range is simply *Coragyps atratus*.

2. The genus *Cathartes*.

Study of a long series of birds from North and Central America and the West Indies has revealed the existence of a hitherto undescribed subspecies, the one inhabiting western North America. No name being already available for this form, it may be called

Cathartes aura teter, subsp. nov.

Type.—Adult female, coll. Biological Survey, U. S. Dept. Agriculture 285275, collected at Riverside, California, April 12, 1892, by A. H. Higginson.

Subspecific characters.—Similar in coloration to *C. a. aura* and *C. a. septentrionalis*, but with the small wing of the former and the long tail of the latter race.

Measurements of type.—Wing (chord) 504; tail 258; culmen from cere 25; tarsus 62 mm.

Remarks.—Of this new form I have seen 33 adult specimens; their dimensions are as follows (sexes alike): wing 480–528 [one specimen 543] (507); tail 252–282 (262.4); culmen from the cere 24–26 (24.9); tarsus 62–68 (65 mm.). Compared with this are the following data on 24 adult specimens of *septentrionalis*: wing 530–563 (545.6); tail 260–289 (279.2); culmen from the cere 23–26.5 (25.1); tarsus 60–67 (64.2 mm.). Of the nominate race 20 adults show the following size variations: wing 475–514 (492.2); tail 235–250 (246); culmen from the cere 20.5–25.5 (24.8); tarsus 63–68 (65.4 mm.).

The ranges of the three forms of the turkey vulture may be outlined as follows:

1. *C. a. aura*: The lower, tropical portions of Mexico from Vera Cruz; Quintana Roo, Yucatan; Mazatlan; Sinaloa; Tres Marias Islands; south through Central America to Panama (Farfan; Canal Zone; Barro Colorado) and to northern Colombia (Rio Frio; Magdalena; Mamatoco, Santa Marta); also in the Bahamas, Cuba, Isle of Pines, Jamaica, Porto Rico (introduced), and the Virgin Islands; possibly formerly in Hispaniola.

2. *C. a. septentrionalis*: Southern Ontario, central New York, Connecticut, and New Jersey, Ohio, Indiana, Illinois, and eastern Iowa, south through Missouri and Arkansas to Louisiana, the Gulf States generally and to southern Florida (at least to Miami and Cedar Keys; no specimens seen from the extreme tip of the peninsula or the keys, where it is not impossible that *aura* may occur). Breeds north to southeastern Michigan, southeastern New York and Connecticut, winters throughout its range except north of the Ohio Valley; casual in northern Ontario, northern New England, New Brunswick, and Newfoundland. (One record from British Columbia!)

S. C. a. teter: Austral zones from southern British Columbia, central Alberta, Saskatchewan, southern Manitoba, Wisconsin, northern Minnesota, and southwestern and south-central Michigan south to southern lower California, northern Mexico (Sonora (Guadalupe Canyon), Chihuahua, and Tamaulipas south in the plateau to Michoacan), east to eastern Texas, Oklahoma, Kansas, Nebraska, the Dakotas, Minnesota, and south-central Michigan, intergrading with *septrionalis* in southeastern Michigan, and probably in western Missouri. Winters from California to Nebraska and southward.

For the loan of material used in this study I am indebted to the authorities of the following institutions: The Museum of Comparative Zoölogy, Cambridge; the American Museum of Natural History, New York; the Carnegie Museum, Pittsburgh; the Museum of the University of Minnesota, Minneapolis; the Museum of the University of Iowa, Iowa City; the University Museums, University of Michigan, Ann Arbor.

Owing to the fact that the western form extends eastward as far as south central Michigan, it became imperative to know to which form the name *septrionalis* should apply. *Septentrionalis* is based on Maximilian's, Prince of Wied, birds from New Harmony, Indiana. Apparently no museum possessed a topotypical specimen and it was not until Miss Louise M. Husband, Librarian of the Workingmen's Institute, New Harmony, very kindly took the trouble of having a specimen shot and sent to the United States National Museum, especially for use in this study, that it was possible to settle this matter. The New Harmony bird is of the large, eastern race, to which the name *septrionalis* must therefore be applied.

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A NEW MUTISIA FROM PERU.

BY S. F. BLAKE.

Recent study of the material of the genus *Mutisia* in the U. S. National Herbarium and a hasty examination of that in the Gray Herbarium has led to the detection of a handsome new species which is here described. In addition, two previously described species are reduced to what appears to be their proper rank, one as a variety, the other as a synonym.

***Mutisia venusta* Blake, sp. nov.**

Planta scandens; caulis subangulatus exalatus tenuiter griseo-lanuginosus; folia pinnatisecta sessilia, rachide griseo-lanuginosa, segmentis 8-9-jugis oppositis v. saepius alternis ellipticis v. oblongo-ellipticis sessilibus v. subpetiolulatis non decurrentibus obtusis vel rotundatis apiculatis paene glabris, cirrho trifido; pedunculi 5-17 cm. longi nudi v. ad apicem parvibracteati; involucri 6.5-7.3 cm. longi sicc. 1.5-2 cm. diam. cylindrici valde gradati phyllaria arcte appressa (extima siccitate interdum laxe patentia) tenuiter subcoriacea sicc. nigrescentia lucida, extima parva triangulari-ovata acuminata parce sordido-lanuginosa glabrescentia, media lineari-oblonga acuta, intima lineari-oblonga obtusa apiculata; radii ca. 7 lanceolato-ovati coccinei.

Stem about 3 mm. thick; internodes 2-14 cm. long; rachis of leaves 5.5-13 cm. long (excluding tendril), the tendrils up to about 3 cm. long; lowest pair of leaflets small, about 7 mm. long, obliquely ovate, semicordate, the others mostly 2.3-4.2 cm. long, 9-14 mm. wide, rounded at base, firm, entire, flat, prominulous-reticulate beneath, lanuginous at base of costa; involucre subcylindric, slightly tapering upward when fresh and then bright green, about 7-8-seriate, the phyllaries not very numerous, the outer ones 7-20 mm. long, 2.5-6 mm. wide, the inner 7-9 mm. wide, finely ciliate and with a small woolly tuft at apex, otherwise glabrous; ray corollas scarlet, the tube 7 cm. long, the limb sharply 3-dentate, 3.2 cm. long, 9 mm. wide, the achenes (immature ?) 4 mm. long, the plumose pappus 2.2 cm. long; disk flowers about 17-18, 6.2 cm. long (tube 1.1 cm., outer lip linear, 3-toothed, 4-nerved, 5.1 cm. long, 2.5 mm. wide, inner lip of two linear divisions 0.8 mm. wide equaling the outer lip, one of them sometimes connate for some distance with the outer lip), the achenes (immature ?)

glabrous, 2.5 mm. long, the pappus bristles plumose, 2.3 cm. long, brownish; anthers 2.6 cm. long including the tails, these 1 cm. long.

PERU: Trailing over rocks, Piñasniocj, Panticalla Pass, near Ollantaytambo, alt. about 3600 m., 18 June 1915, *O. F. Cook & G. B. Gilbert* 1235 (type no. 604430, U. S. Nat. Herb.); same locality, 16 July 1915, *Cook & Gilbert* 1879.

A species of the Sect. *Pinnatisectae*, related to *M. viciaefolia* Cav. and the doubtfully distinct *M. peduncularis* Cav., but readily distinguished from the extensive series of these species examined by its acuminate outer phyllaries, those of the species mentioned being obtuse or rounded. Mr. Cook informs me that this plant flowers in winter, in a locality where the temperature goes well below the freezing point every night.

MUTISIA DECURRENS var. **patagonica** (Phil.) Blake.

Mutisia patagonica Phil. *Linnaea* 28: 711. 1858.¹

Mutisia patagonica Phil., based on material collected by Fonk "ad marginem lacus Nahuelhuapi," was described as similar to *M. decurrens* Cav., but with the leaves and ligules arachnoid-lanuginous beneath. In the U. S. National Herbarium is a sheet collected by Dr. Otto Buchtien (no. 60) at San Carlos de Bariloche (on Lake Nahuelhuapi), 4 Feb. 1905, bearing two specimens, one of which is typical *M. decurrens* Cav., the other obviously of the same species but with the leaves canescent-tomentose beneath. The ligules are more or less arachnoid-tomentose beneath in both. In the Gray Herbarium is another sheet from Buchtien, similar enough to be of the same collection but dated 16 Feb. 1905 and distributed by Baenitz under the number 1351, in which the leaves are rather thinly gray-tomentose beneath, in some cases more or less completely glabrate. The occurrence of the two forms together and the lack of any other distinctive features show that *M. patagonica* is best treated as a variety of *M. decurrens*, distinguished by the same character as several variants already recognized in other species of the genus.

MUTISIA ANDERSONI Sodiro; Hieron. *Bot. Jahrb. Engl.* 28: 80. 1900.

Mutisia sagittifolia Blake, *Bot. Gaz.* 74: 428. 1922.

The identity of *Mutisia sagittifolia*, based on *Holway* 941 (of 1920) from Mt. Pichincha, Ecuador, with the earlier *M. andersoni* is proved by examination of a photograph in the Gray Herbarium of Hieronymus' type (*Sodiro* 63/1) at Berlin, in connection with the study of two additional specimens in the U. S. National Herbarium (*Mille* 756, from Mt. Pichincha, 1917, and *Rimbach* 206, from Prov. Riobamba, Ecuador, alt. 3300 m.). The toothed cauline wings mentioned in the original description of *M. andersoni* are very obscure or wanting in the specimens examined. In general, it is evident that distinctions drawn from the presence or absence of wings on the stem, and their degree of development when present, must be applied with caution in this genus.

¹The dates of publication of the 6 hefte of vol. 28 of *Linnaea*, as shown by the original covers of the parts in the copy in the U. S. Department of Agriculture, are as follows: Heft 1 (p. 1-128), Aug. 1856; Heft 2 (p. 129-256), Sept. 1856; Heft 3 (p. 257-384, pl. 1-2), Jan. 1857; Heft 4 (p. 385-512), June 1857; Heft 5 (p. 513-640), Aug. 1857; Heft 6 (p. 641-767), Feb. 1858. The whole volume is usually cited as of 1856, the title-page date.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SUBSPECIES OF THE SNAIL KITE, *ROSTRHAMUS SOCIABILIS* (VIEILLOT).

BY E. W. NELSON AND E. A. GOLDMAN.

We are indebted to Dr. Herbert Friedmann for directing our attention to an interesting new geographic race of *Rostrhamus sociabilis* collected by us during our work in Mexico. The type, a male, while full grown is in the immature plumage. Two other full grown young males in the Biological Survey collection taken at Flores, Lake Peten, Guatemala, by Harry Malleis, June 18, 1923, were evidently residents. Still another specimen of the same form in fully adult plumage in the National Museum, lacks full data. It was probably collected by F. Sartorius as the locality is given, with a query, as Mirador, the name of his coffee plantation in Vera Cruz.

Rostrhamus sociabilis major, subsp. nov.

MEXICAN SNAIL KITE.

Type.—Catemaco, Vera Cruz, Mexico (altitude 1,000 feet). No. 144168, ♂ (subadult plumage), U. S. National Museum (Biological Survey collection), collected by Nelson and Goldman, April 26, 1894. Original number 1980.

Distribution.—Lowlands of eastern Mexico and Peten district of northern Guatemala.

General characters.—Color practically as in *Rostrhamus socialis socialis* of South America and *R. s. plumbeus* of Florida; size largest of the known forms of the species; bill much larger and heavier; wings and tail longer.

Measurements.—*Type*: Wing, 380 mm.; tail, 198; tarsus, 52; culmen from cere, 30; culmen including cere, 38.

Remarks.—The new form is readily distinguished by the remarkable size of the bill. It agrees closely in color, however, and other essential characters with the more northern and southern subspecies.

PROCEEDINGS
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THREE NEW RODENTS FROM SOUTHERN MEXICO.

BY E. W. NELSON AND E. A. GOLDMAN.

In dealing with cotton rats from western Mexico, J. A. Allen (Bull. Amer. Mus. Nat. Hist., vol. 22, art. 12, p. 210, July 25, 1906) states that *Sigmodon alleni* Bailey, described from San Sebastian, Mascota, Jalisco is "beyond question a synonym of *mascotensis*." *Sigmodon mascotensis* had been described by Allen from the same locality. Examination of the types of *mascotensis* and *alleni* shows that the former is a member of the *Sigmodon hispidus* group as assigned by Bailey (Proc. Biol. Soc. Washington, vol. 15, p. 108, June 2, 1902), while contrary to Allen's conclusion quoted the latter is a distinct species of the *Sigmodon fulviventer* group.

The cotton rats of the *fulviventer* group are rarer and much less widely distributed than those of the *hispidus* group. Two new members of the genus based upon scanty material, are here regarded as specifically distinct, owing to salient characters presented, and the absence of evidence of intergradation with any others of the group. A new pocket gopher of the *Orthogeomys grandis* group is also described.

***Orthogeomys grandis annexus*, subsp. nov.**

TUXTLA POCKET GOPHER.

Type.—From Tuxtla Gutierrez, Chiapas, Mexico (altitude 2,600 feet). No. 75949, ♀ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Nelson and Goldman, September 11, 1895. Original number 8418.

Distribution.—Arid tropical valley of the Chiapas River in the interior of the state of Chiapas; limits of range unknown.

General characters.—A sparsely and coarsely-haired subspecies, closely resembling *Orthogeomys grandis scalops* of the arid lowlands near Tehuantepec, Oaxaca, in external appearance, but cranial details quite distinctive. Differing from *Orthogeomys grandis grandis* of the highlands of Guatemala in thinner, coarser pelage, and in important skull characters, notably the

straighter upper outline of cranium. Smaller than *Orthogeomys grandis nelsoni* of the high mountains of northeastern Oaxaca, with thinner pelage and divergent cranial features.

Color.—*Type*: Upper parts and outer surfaces of forearms and thighs near Mars brown of Ridgway; under parts and inner surfaces of limbs similar to upper parts, but somewhat lighter in tone, the pelage so sparse that the naked skin is clearly visible; feet very scantily clothed with light brownish hairs; tail naked, the skin yellowish.

Skull.—Similar in size and general form to that of *O. g. scalops*, but less angular; upper longitudinal outline nearly straight—straighter even than in *scalops*; rostrum more slender; nasals broader posteriorly; outer surface of zygoma narrower at point of union of maxilla and jugal; supraorbital borders of frontals more nearly parallel, with a less distinct interorbital constriction; squamosals broader between auditory meatuses; pterygoids broader, the interpterygoid space opening more widely posteriorly; auditory bullae less angular, more rounded and inflated; dentition about the same. Compared with *O. g. grandis* the skull is smaller, less angular; profile straighter, without the marked depression near the fronto-parietal suture and lacking the anterior frontal inflation of *grandis*; rostrum less elongated; lambdoid crest more evenly curved, less sinuous, less concave forward at median line, as viewed from above; squamosal shelves broader between auditory meatuses; jugal more expanded anteriorly, inserted farther forward in maxilla; basioccipital broader; pterygoids broad and shaped much as in *grandis*; auditory bullae more inflated anteriorly, bulging downward more nearly to lower plane of basioccipital; dentition about the same. Smaller, less elongated than that of *O. g. nelsoni*; profile straighter without anterior frontal swelling; ascending branches of premaxillae much narrower; nasals less decurved anteriorly, much broader, less tapering, the sides parallel near posterior ends; squamosals broader between auditory meatuses; basioccipital broader; auditory bullae more rounded and inflated, less angular; dentition about the same.

Measurements.—*Type*: Total length, 366 mm.; tail vertebrae, 119; hind foot, 49. *Skull* (type): Condylbasal length, 66; zygomatic breadth (anteriorly), 37.6; greatest breadth across squamosals, 39.1; squamosal constriction between auditory meatuses, 28.5; interorbital constriction, 14.2, length of nasals, 25.4; alveolar length of upper molariform toothrow, 14.2.

Remarks.—*Orthogeomys grandis annexus* is based on a single specimen which shows close relationship to the neighboring forms already described, but exhibits cranial characters beyond the range of individual variation usual in the group. It apparently represents a subspecies that may have an extensive range along the valley of the Chiapas River.

Sigmodon guerrerensis, sp. nov.

GUERRERO COTTON RAT.

Type.—From Omilteme, Guerrero, Mexico (altitude 8,000 feet). No. 126936, ♀ adult, skin and skull, U. S. National Museum (Biological

Survey collection), collected by Nelson and Goldman, May 21, 1903. Original number 16467.

Distribution.—Known only from the type locality in the high mountains of central Guerrero.

General characters.—A large rich-colored species of the *Sigmodon fulviventer* group. Resembling *S. alleni* of Jalisco, but larger and color darker, more tawny; skull differing in detail. Similar to *S. vulcani* of the Volcan de Fuego, but color richer, much more tawny instead of ochraceous. Not very unlike *S. alticola* of the high mountains of central Oaxaca in color, but upper parts more uniformly tawny (dorsum distinctly 'lined' with buffy hairs in *alticola*), and ears blacker; cranial characters very distinctive.

Color.—*Type*: Upper parts light tawny, richest on rump, but purest on cheeks, shoulders and flanks, the top of head and back mixed or lined with black; under parts overlaid with cinnamon buff, becoming abruptly tawny on a narrow area across base of tail; ears blackish; outer sides of forearms and thighs like flanks; fore feet grayish buffy; hind feet dull ochraceous buffy over tarsus, becoming grayish on toes; tail dark brown above, lighter brown below. In an adult topotype the under parts are dull white instead of cinnamon buff as in the type.

Skull.—About like that of *S. vulcani*. Very similar to that of *S. alleni*, but larger, more angular, with relatively heavier molars; supraorbital and temporal ridges more strongly developed; interparietal large, the anterior border convex or nearly straight and upper incisors heavy and recurved as in *alleni*. Contrasting strongly with *S. alticola* as follows: Braincase relatively more elongated; rostrum and nasals decidedly broader; interparietal much longer (antero-posteriorly). with a prominent posterior angle; supraoccipital region rising nearly perpendicularly (not sloping forward at expense of interparietal as in *alticola*); dentition heavier.

Measurements.—*Type*: Total length, 278 mm.; tail vertebrae, 128; hind foot, 32. An adult female topotype: 293; 130; 33. *Skull* (type): Greatest length, 34; condylobasal length, 32; zygomatic breadth, 18.9; interorbital breadth, 5.6; nasals, 13.2; width of braincase (immediately in front of descending process of supraoccipital), 13.3; width of rostrum (maxillae at antorbital notch), 6.1; interparietal (at median line), 4.2; maxillary toothrow (alveoli), 6.3.

Remarks.—*Sigmodon guerrensis* is closely allied to *S. alleni* and *S. vulcani*, but the characters pointed out are quite distinctive. It occurs in a more humid area and may be isolated by the broad arid valley of the Balsas River. While a member of the *S. fulviventer* group, as distinguished from the more widely dispersed *S. hispidus* group, it requires no close comparison with the much paler species *fulviventer* of the interior plateau region of Zacatecas and Durango.

Specimens examined.—Two, from the type locality.

***Sigmodon planifrons*, sp. nov.**

OAXACA COTTON RAT.

Type.—From Juquila, southwestern Oaxaca, Mexico (altitude 5,000 feet). No. 71918, ♀ adult, skin and skull, U. S. National Museum (Bio-

logical Survey collection), collected by Nelson and Goldman, February 28, 1895. Original number 7569.

Distribution.—Known only from the type locality in the mountains of southwestern Oaxaca.

General characters.—Size smallest of the *Sigmodon fulviventer* group; skull small and delicate in structure. Apparently allied to *Sigmodon alticola* of the high mountains of central Oaxaca, but general color paler, the ears clothed with finely mixed black and buffy banded hairs like body (contrasting with finely grizzled ears of *alticola*), and cranial characters distinctive. Closely resembling *S. alleni* in color, but cranial characters, especially the slenderer, more depressed rostrum and less recurved incisors quite different.

Color.—*Type*: Upper parts in general between ochraceous buff and ochraceous tawny (Ridgway, 1912), mixed with black, the dark hairs most numerous on top of head and back, thinning out along sides; rump suffused with light tawny; under parts overlaid with dull white, the under color dark plumbeous; ears about like back; feet buffy grayish; tail dark brown above, lighter brown below.

Skull.—Cranium small, relatively low and weakly developed. Somewhat like that of *alticola*, but smaller and flatter; zygomatic plate broader antero-posteriorly, as viewed from the side; auditory bullae much smaller; rostrum slender and upper incisors with slight recurvature as in *alticola*. Similar in general to that of *alleni*, but smaller, flatter, less angular, the basicranial region more smoothly rounded; rostrum slenderer, shallower, more depressed anteriorly; auditory bullae small as in *alleni*; upper incisors lighter, less recurved.

Measurements.—*Type*: Total length, 207; tail vertebrae, 88; hind foot, 29. *Skull* (adult ♀ topotype): Greatest length, 29.5; condylobasal length, 27.9; zygomatic breadth, 17.3; interorbital breadth, 4.7; nasals, 11.8; width of braincase (immediately in front of descending process of supra-occipital), 12.4; width of rostrum (maxillae at antorbital notch), 3.7; interparietal (at median line), 1.8; maxillary toothrow (alveoli), 5.9.

Remarks.—This form is based upon a skin and two skulls from the type locality. The skin closely resembles *S. alleni*, but the skulls suggest relationship to the nearer geographic neighbor *S. alticola*. It differs, however, from both in characters that seem to warrant specific recognition. No close comparison with the much larger, higher mountain species, *S. guerrensis* is required.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THE CUBAN RACE OF THE SNAIL KITE,
ROSTRHAMUS SOCIABILIS (VIEILLOT).

BY HERBERT FRIEDMANN.¹

In a paper in the present volume (p. 193) Nelson and Goldman describe a new subspecies of this hawk from Vera Cruz, characterized by its large size. Study of specimens from the entire range of the species reveals still another hitherto unrecognized form—the bird of Cuba and the Isle of Pines. This may be known as

***Rostrhamus sociabilis levis*, subsp. nov.**

Type.—U. S. Nat. Mus. 29578, immature male, collected in Cuba (no definite locality given) by Charles Wright.

Subspecific characters.—Wing length as in *R. s. plumbeus* but bill size as in *R. s. sociabilis*.

Measurements of type.—Wing 351, tail 189.5, tarsus 56, culmen from cere 25.5, culmen with cere 32 mm.

Remarks.—Four other Cuban specimens present the following dimensions: wing 350-371 (359), culmen from cere 25-26 (25.2); culmen with cere 32.5-35.5 (33.7 mm.).

For comparative purposes the characters of the nominate race and the Florida form *plumbeus* may be stated briefly. The typical subspecies is a short-winged (325-341, average 331.2 mm.) and large-billed race (culmen from cere 24-26 (25 mm.); culmen including cere 32.2 mm.). The form *plumbeus* is a long-winged (340-368; average 356.7 mm.) and small-billed race (culmen from cere 22-25 (23.3); culmen including cere 29-32.5 (30.4 mm.)). The nominate subspecies ranges from Uruguay and the northern half of Argentina north to eastern Panama, intergrading in Costa Rica, Nicaragua, and Honduras with the very large Mexican-Guatemalan form. *R. s. plumbeus* is found only in peninsular Florida.

Range.—*R. s. levis* occurs in Cuba and the Isle of Pines.

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PROCEEDINGS
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TWO APPARENTLY UNRECOGNIZED RACES OF
NORTH AMERICAN BIRDS.

BY LOUIS B. BISHOP.

In the description of unrecognized subspecies now-a-days one expects not honor, rather obloquy and contumely. That this should be so is easy to understand, as the great majority of those interested in birds study them from some other standpoint, and are not interested, but rather repelled, by what to them seems an overdrawn nicety of discrimination. That forms whose differences are only average, and of which many specimens can not be properly allocated without referring to the locality given on the label, do not deserve subspecific recognition I cordially agree; but when in studying a series of specimens one finds a number from a given locality which he can not call by the name of any at present accepted race without doing injustice to his sense of the truth, he must group these differences under a new name, so that those studying other aspects of avian life may be sure which bird it is of which they are writing.

This is my apology for the two races described below.

***Hylocichla guttata dwighti*, subsp. nov.¹**

DWIGHT'S HERMIT THRUSH.

Type.—Male adult; no. 43677, collection of Louis B. Bishop; Lion Creek, Priest Lake, Idaho, June 23, 1929; elevation 5500 feet; no. 3165 of Charles F. Hedges, collector.

Subspecific characters.—Similar to *Hylocichla guttata auduboni* of the southern Rocky Mountains, but much smaller; approaching *H. g. nana* and *guttata* in size, but much grayer. Two breeding males from Priest Lake are between hair brown and grayish olive (of Ridgway) above; three young females collected at Priest Lake in September and October are from light brownish olive to buffy olive.

¹Named in memory of Dr. Jonathan Dwight.

Measurements.—Adult males (2 from Priest Lake): wing, 92.5–94 mm. (average 93.2); tail, 71.3–74 (72.6); exposed culmen, 13.5–13.8 (13.7); tarsus, 27.4–28.4 (27.9). Immature females (three from Priest Lake): 86–89.8 (87.3); tail, 66.5–71 (68.1); exposed culmen, 12–13 (12.3); tarsus, 28.3–30 (29.1).

Range.—Northern Idaho in summer, passing south through Arizona in fall and southwestern Idaho in spring.

Remarks.—During the years 1926–31, Mr. Charles F. Hedges collected for me a number of birds in Idaho, chiefly at Coeur d'Alene, Priest Lake, in the northern part of the state, and at Payette in the southwestern portion. When I received the two male Hermit Thrushes described above they were so different from any race I knew that I asked him to get more; but the bird was evidently rare, or he was not at the center of abundance, as the three young females from Coolin, Priest Lake, mentioned above, were all he was able to take. A female (?) Hermit Thrush, however, which he collected at Payette on May 19, 1930, is identical in color with the June males from Priest Lake, and has a wing of 92 mm.; tail, 73; exposed culmen, 13.7; tarsus, 29.8. An adult male Hermit Thrush collected by Mr. H. H. Kimball at Cooley, Arizona, Nov. 10, 1920, and a young female on Nov. 2 (35135,7) agree in color with the fall birds from Priest Lake, and are about the same size—wing, 89.5 and 86.5; tail, 67.5, 68; exposed culmen, 14, 14.3; tarsus, 28.5, 29—and I refer them to *dwighti*.

The type of *H. g. auduboni*,—a male, collected at Fort Bridger, Utah (now Wyoming), May 28, 1858, now no. 10886, United States National Museum,—Dr. Oberholser has kindly measured for me and finds the wing 106 mm.; tail, 80; exposed culmen, 15; tarsus, 32.5. Seven male Hermit Thrushes from Reserve, New Mexico, and Paradise and the Chiricahua Mountains, Arizona, collected by H. H. Kimball, average,—wing 103.4; tail 81; exposed culmen, 14.8; tarsus, 30.3, and indicate the name *auduboni* properly belongs to the bird of the southern Rockies, and the northern Idaho bird is new.

In Idaho the summer range of *dwighti* is apparently limited to the far northern portion, as the only Hermit Thrushes Mr. Hedges collected at Coeur d'Alene—a male on Oct. 4, and a female on Oct. 8, 1926—are referable to *H. g. guttata*. While three breeding birds he obtained at 4500–4700 feet at Tamarack, Washington Co., in the southwestern part of Idaho,—one male and two females,—I refer to *H. g. polionota*, as in color above they resemble closely *H. ustulata swainsoni*, and measure—male, wing 105; tail, 81; exposed culmen, 15; tarsus, 32; females, wing, 92.5–95.5; tail, 75–73; exposed culmen, 15–14.3; tarsus, 29–30. To this race also I refer two males collected by Mr. Kimball at Saliz Canyon, Reserve, New Mexico, on Sept. 27 and Oct. 5, 1927, and a female on Oct. 9, 1928 (41639–40, 43176), because of their close resemblance in color to the Tamarack birds, though they are slightly smaller.

If the slightly smaller Hermit Thrush of the Cascade Mountains of Oregon and Washington be considered sufficiently distinct from *sequoiensis* of the Sierras, and *Hylocichla guttata oromela*² of Dr. Oberholser be recog-

²Scientific Publications of the Cleveland Museum of Natural History, IV, No. 1, p. 8.

nized, to it must be referred five male and six female Hermit Thrushes collected by Mr. Kimball in Reserve, New Mexico, and Tucson, Arizona, in March, April and October, now in my collection, and one collected by Mr. J. T. Wright at Chinobampo, Sonora, in February.

***Lanius ludovicianus miamensis*, subsp. nov.**

MIAMI SHRIKE.

Type.—Male adult; no. 48332, collection of Louis B. Bishop; Cutler, Dade Co., Florida, February 5, 1932; L. B. Bishop, collector.

Subspecific characters.—Resembles most closely *L. l. excubitorides* and *sonoriensis* in color, but is even clearer bluish (not brownish) gray above—about light neutral gray of Ridgway, and purer white on breast and lower parts, not stained with brown; wing and tail shorter, bill shorter and less hooked than *sonoriensis*. Resembles *ludovicianus*, but is much paler above (not the dark gull gray of the latter), and pure white, not sooty white, below; wing and tail slightly shorter and bill longer and heavier.

Measurements of five males and five females, all from Dade county, Florida—Males: wing 93–98 mm. (average 95.4); tail, 94.5–99.5 (97.9); exposed culmen, 16.3–17 (16.9); depth of bill at base, 8.8–9.7 (9.3). Females: wing, 89.5–94 (91.3); tail, 89–94.3 (92.5); exposed culmen, 15.4–16.8 (16.1); depth of bill at base, 9 mm. Nineteen (twelve males and seven females) *L. l. ludovicianus* from Robeson Co., North Carolina; Mt. Pleasant and St. Helen's Island, South Carolina; Roswell, Georgia; Stewartville, Alabama; Amelia Island, Enterprise, Orlando, Palatka, Lundy, Buffalo Bluffs, and Putnam Co., Florida; males: wing, 96.3–103.3 (98.2); tail, 91.7–108 (99.2); exposed culmen, 14.8–17.5 (16.3); depth of bill at base, 8.2–10 (9.1); females: wing, 93–100 (95.4); tail, 93–103 (98.5); exposed culmen, 14.5–17.6 (15.5); depth of bill at base, 8–9.5 (8.8).

Range.—Dade County, Florida, including Key Largo. A common, permanent resident.

Remarks.—As is well known, southeastern Florida is the only portion of the United States in the Humid Tropical Zone, and avian forms from the West Indies find their northern limit there. Remembering this I collected one or two of most of the resident species, including four shrikes, all from south of Miami, while spending the winter of 1931–2 at Coconut Grove. More it seemed inadvisable to take, as the Assistant Game Commissioner was very averse to scientific collecting.

But those four shrikes, on comparison with others from farther north in the state, showed themselves at once so distinct that I asked Mr. Semple to aid me, and through his kindness I obtained four more, including one from Key Largo, where shrikes are very rare; Mr. Adriaan van Rossem lent me two from the Donald Dickey collection in the California Institute of Technology collected by Mr. H. H. Bailey south of Miami. To these gentlemen my thanks are due as these specimens verified what mine indicated. Forty shrikes from northern Florida and eight from North and South Carolina, Georgia and Alabama, which I examined in this connection, show upper parts of neutral gray to dark gull gray with no approach to the pale to light neutral gray of *miamensis*. The scapulars also are more broadly

white, in the latter, and the upper tail-coverts often as white as in *excubitorides* and *sonoriensis*.

This study led me to an examination of some 90 shrikes from the West, and these birds agreed with Dr. Miller's dictum that birds from the coast region of California north to Payette, Idaho, and northeast to Deer Lodge, Montana, and Salt Lake City, Utah, are darker—*gambeli*, and that birds from Imperial and part of Riverside counties, California, southern Arizona and New Mexico, and south into Sonora, Mexico, are slightly paler, with longer tails and slightly longer bills with a more pronounced hook than *gambeli*, and also than the birds of the region west of the Mississippi Valley not included in the ranges of the other two. I believe his *sonoriensis* is an easily recognizable race. But I fail utterly to find any satisfactory characters separating his *nevadensis* from the other birds of that region, and think *excubitorides* must be applied to all the shrikes from Manitoba, North Dakota, Saskatchewan, western Kansas, western Texas, Colorado, to Bakersfield in the southern San Joaquin Valley and Victorville on the Mojave Desert of California, occasionally wandering south in winter to Witch Creek, San Diego Co.; though I heartily agree that birds from the eastern border of this range blend into *migrans*, as the latter does into *ludovicianus*.

This brings me to another point on which Dr. Miller and I differ, that is our definition of intergradation. Some years ago in *The Condor* I stated *excubitorides* (then including *sonoriensis*) breeding in close connection with *gambeli* in southeastern San Bernardino County in the Mojave Desert does not intergrade with it, and that the same was true at San Gorgonio Pass, while Dr. Miller, in his description of *sonoriensis* and *nevadensis* in *The Condor*, XXX, p. 155 and 6, and in his *Systematic Revision and Natural History of American Shrikes* (Lanius), p. 69, says they do. Intergradation as I understand it is exemplified in a meeting and blending such as occurs where *excubitorides* and *migrans* and the latter and *ludovicianus* meet; but this condition is not what obtains where *gambeli* and *sonoriensis* breed only a few miles apart at San Gorgonio Pass, or where *gambeli* and *excubitorides* breed side by side in the Mojave Desert. Fourteen shrikes which I have collected in the Coachella and Imperial Valleys are all *sonoriensis* while those on the western side and even through San Gorgonio Pass to Cabazon and Fingal are easily recognizable as *gambeli*. An adult and soon-to-lay female (42304) collected at Coyote Wells on the western side of the Imperial Valley on February 6, 1928, is particularly instructive in this connection; it combines the long tail (108 mm.) of *sonoriensis* with the darker colors and shorter bill of *gambeli*—a condition indicative of hybridism, not intergradation. An adult male on the other hand (42505) collected by Mr. George G. Cantwell at Palms, Los Angeles County, on Sept. 12, 1928, has the shorter bill of *excubitorides* but the longer tail (108 mm.) and slightly paler upper parts of *sonoriensis*. From near Victorville on the Mojave Desert I collected ten shrikes, five males and five females, almost all in March or April. Of these birds two males and two females seem to me typical *excubitorides*, two males and two females equally typical of *gambeli*, and the remaining male and female intermediate. As I under-

stand Mendel's law this is the condition and ratio to be expected where two *species* hybridize. Therefore, since I find races, characterized by only such slight differences that I must believe they were developed in a not very remote past, when meeting on the same breeding ground still retain these same small peculiarities, I can only conclude that in spite of appearances, they have become so somatically and genetically distinct that they hybridize as species do, not merely intergrade.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THE LONG-TAILED MEADOW-MOUSE OF
SOUTHEASTERN ALASKA.

BY HARRY S. SWARTH,
California Academy of Sciences.

The long-tailed meadow-mouse of the Sitkan district, southeastern Alaska, has commonly gone under the name of *Microtus macrurus* Merriam (Proc. Acad. Nat. Sci. Phila., 1898, p. 353), described from Lake Cushman, Olympic Mountains, Washington. From the first, Alaskan specimens so-called were recognized as being slightly different, but nevertheless it has been assumed that *Microtus macrurus* inhabited the coastal strip from Puget Sound north to Yakutat Bay. In 1919 Mr. Joseph Dixon and myself collected a series of specimens along the valley of the lower Stikine River whereby I was able to demonstrate intergradation between the gray *Microtus mordax* of interior British Columbia and the brown "*macrurus*" of the Alaskan coast, and I accordingly labelled the latter *Microtus mordax macrurus* (Univ. Calif. Publ. Zool., vol. 24, 1922, p. 175). At about the same time A. B. Howell had independently arrived at essentially similar conclusions (Journal of Mammalogy, vol. 4, 1923, pp. 33-37), evidently without having seen my own paper. This was all right so far as it went, but my findings had been based entirely on Alaskan material and at the time I did not appreciate the resulting corollaries affecting typical *macrurus* of the Olympic Mountains.

For some years past I have devoted considerable thought, with several seasons of field work, to study of the relationships of the closely adjacent faunas of northern British Columbia and southeastern Alaska. The accumulating evidence goes to show that much of the mammal fauna of the Sitkan district is directly derived from the hinterland east of the Coast

Ranges; that it does not form part of a homogeneous population ranging unchanged the length of the humid coast belt. There are exceptions, of which the Black-tailed Deer is an example, but I have no hesitation in making this rather positive statement of affinities and derivation of most of the Sitkan mammals. With birds it is different (and with plants also, I believe), for much of the avifauna had its origin on the southern coast, but even in the birds there is a certain proportion that provides interesting examples of derivation from the interior.

In this connection it is well to consider the other species of *Microtus* of the Sitkan district. *Microtus sitkensis*, on Baranof and Chichagof islands, is of boreal origin (of the *operarius* group), reaching these northern islands along with certain other more northern forms of life that, with it, do not extend south of Christian Sound and Frederick Sound. The *Microtus pennsylvanicus* stock is widespread in eastern North America, it extends west to the Rocky Mountains in the United States, crosses that range near the Canadian boundary, and (in the race *drummondi*) is abundant as far as the Coast Range in northern British Columbia, a mode of distribution that is repeated over and over again among mammals and birds of the last mentioned region. This meadow-mouse has even found its way through the Coast Range in at least two places, following the valleys of the Taku and Stikine rivers, but although known to occur at the mouths of those streams, it has not spread along the adjacent Alaskan coast. *Microtus pennsylvanicus admiraltiae*, a slightly differentiated offshoot, is restricted to Admiralty Island. The position of this island directly opposite the mouth of the Taku River, and the nebulous character of the differences between *admiraltiae* and *drummondi*, are sufficiently suggestive of the recent derivation and course of travel of the island mouse.

Of most of the small mammals of the Sitkan district there is similar evidence of northern or eastern relationships. Such an exceptional mode of distribution as has been ascribed to *macrurus*, comprising the narrow coastal strip from Puget Sound north into Alaska, should be carefully scrutinized. Furthermore, the demonstrated intergradation between *mordax* of inland British Columbia and "*macrurus*" of the Sitkan district, via the Stikine Valley, implying derivation of the Alaskan stock from the neighboring interior, leaves the more widely different typical *macrurus* of the Olympic Mountains unexplained in relationship to the northern forms.

Derivation of the Alaskan stock of this species from the interior is inferred from satisfactory reasons. Intergradation of the sort described is commonly accepted as the test of subspecific difference. It implies, I believe, impending separation of parts of a previously homogeneous form (witness the common definition of a subspecies as an incipient species); and, on the other hand, to the best of my belief does not occur when two related forms (even some that are designated as subspecies) approach and meet subsequent to their differentiation in other regions. The last mentioned condition is illustrated in several bird groups in this northwestern country. For examples, the Russet-backed Thrush (*Hylocichla ustulata ustulata*) and Olive-back Thrush (*H. w. swainsoni*) meet in the Stikine

Valley without blending; the Red-shafted Flicker (*Colaptes cafer*) and Yellow-shafted Flicker (*Colaptes auratus*) meet in the Skeena Valley, to result in parti-colored individuals that are commonly regarded not as intermediates but as hybrids. It is safe to say that the Sitkan district was colonized by animal and plant life at a more recent date than the region east of the Coast Ranges or than the coastal region to the southward, and in nearly every case the mammal and bird species of the Sitkan district betray in their physical characteristics or in their mode of local distribution, often in both, the source whence they came.

In the case of the *Microtus* under discussion, if it really were genetically close to *macrurus* of the Olympic Mountains it must have invaded the Sitkan district from the southward, have met with *mordax* of the upper Stikine Valley at a much later period, and have combined with that species to have produced the gradual blend of characters that is evident over so wide an area. These are the corollaries above referred to that I did not grasp at the time when the subspecific relationship of *mordax* and Alaskan "*macrurus*" became clear to me. Of late, realization of the improbability of this situation impelled comparison of specimens from the several regions involved.

True *macrurus* is a rare animal in collections, and in all my previous work on northern mammals I had contented myself with the published statements pertaining to that form, which was no longer satisfactory. In aid of the present study I have been able to borrow from the United States Biological Survey three topotypes of *Microtus macrurus*, and from Field Museum, Chicago, eight more specimens from the Olympic Mountains. Of these eleven specimens, four are fully adult. The Biological Survey series includes also six specimens from Rivers Inlet and three from Lund, localities on the mainland coast of southern British Columbia. I have also had available the large series of *Microtus* of the Sitkan district, Alaska (mostly collected by myself), that is in the Museum of Vertebrate Zoology, University of California.

Comparisons of the several series (and with special reference to three fully adult *macrurus* in the Field Museum collection) is corroborative of the suspicion that the Alaskan form should not be regarded as *Microtus macrurus*. I propose to call it

***Microtus mordax littoralis*, new subspecies.**

Type.—Male adult, skin and skull; no. 8642 University of California Museum of Vertebrate Zoology; Shakan, Prince of Wales Island, Alaska; May 14, 1909; collected by H. S. Swarth; original number 7463.

Geographic range.—Mainland coast and most of the islands of southeastern Alaska. On the coast from Yakutat south at least to Bradfield Canal. On most of the islands of the Alexander Archipelago that lie east of Chatham Strait and to the southward.

Diagnosis.—A long-tailed meadow-mouse of the *Microtus mordax* aggregation. From *M. mordax mordax* of the adjacent interior of British Columbia, *littoralis* differs in being reddish-brown instead of grayish in general aspect, and in having a somewhat longer tail. Intergradation

between *mordax* and *littoralis* has been traced along the valley of the Stikine (see Swarth, Univ. Calif. Publ. Zool., vol. 24, 1922, pp. 175-178).

Measurements.—Type: Length, 189 mm.; tail vertebrae, 72; hind foot 22. Ten adults, Prince of Wales Island, Alaska (average, minimum and maximum): Length, 189.3 mm. (172.0-207.0); tail vertebrae, 73.3 (63.0-80.0); hind foot, 21.1 (20.0-22.0). *Microtus macrurus*: "Average of five specimens from three localities in the Olympic Mountains: 204; 80; 24.3" (Bailey, N. Am. Fauna, 17, 1900, p. 51).

Measurements taken by different individuals, especially under the conditions ordinarily affecting the field collector, are not a satisfactory basis for fine comparisons, but, making all necessary allowances, adult examples of *Microtus macrurus* are clearly larger than any form of *mordax* that I have seen (except *Microtus coronarius*). *Macrurus* is darker colored, less reddish above; and the belly is darker colored than in *littoralis* and not so sharply contrasted with the sides. In *macrurus* the tail is longer. In most specimens it is scantily haired, almost the same color above and below; only in the younger examples does it approach the sharply bicolored effect that is the rule in *littoralis*.

The skull of adult *macrurus* is appreciably larger than that of *littoralis*, reflecting the general size differences that are apparent in the externals of the two. Despite the greater size, the skull of *macrurus* presents a weaker appearance, being built on more slender lines, with the zygomata less wide set and angular than in *littoralis*, the nasal region rather more elongated.

I can not now regard *macrurus* as a subspecies of *Microtus mordax*, the available specimens being few in number and otherwise unsatisfactory as a basis for such a decision. The several skins at hand from the British Columbia mainland at Lund and Rivers Inlet I am content for the present to consider the same as *macrurus* of the Olympic Peninsula, but it will require much more material and from localities not now represented in collections before satisfactory conclusions can be reached regarding relationships and distribution of the long-tailed forms of *Microtus* of the Puget Sound region. Elliot (Field Colum. Mus., Zool. Ser. I, 1899, p. 257) remarks of *macrurus*: "This large species was only procured by me on the banks of the Elwah and was not seen on the high mountains, so I concluded it was an inhabitant of the lowlands, possibly, indeed, also a littoral form." The Lund and Rivers Inlet occurrences are corroborative of this view. I believe that there is close relationship between *Microtus macrurus* and *M. tetramerus* of Vancouver Island, which is not surprising, considering the geographical situation. The Vancouver Island mouse is smaller and slightly more reddish, but it has the same sort of tail as *macrurus*, though a shorter one, and the same character of skull.

The assumption of continuous distribution of *macrurus* along the coast north from Puget Sound to Alaska was never based upon specimens. Between those points lie some hundreds of miles of shore line almost unknown zoologically. Considerable field work has been done on Vancouver Island and on the Queen Charlotte Islands, but otherwise the entire coast of British Columbia, mainland and islands, awaits even the most cursory inspection of its fauna. Neither are there available any *Microtus* from the

southernmost 125 miles of the adjoining Alaskan mainland. I, myself, trapped at several points in the last mentioned territory without result, though I got specimens on some of the neighboring islands.

Howell (*loc. cit.*) remarks: "Specimens of *macrurus* from southern Alaska are puzzling. Series from almost every locality available show slight, consistent differences, but in no case are these sufficient for subspecific rank, and they must all be included under the one name." This condition, as well as peculiarities of distribution, might be explained under the theory I am here advancing, namely, that these mice have found their way to the Alaskan coast from the adjacent interior and by several routes, the Alaskan population therefore consisting of colonies derived from slightly different sources and perhaps remaining separated up to the present time. This is just the situation that we can see exists in the case of the forms of *Microtus pennsylvanicus* in the same region.

In southeastern Alaska there is a peculiar development in the existence of *Microtus coronarius*, a giant form of the same stock as *M. mordax littoralis*, and one that has apparently originated in its present environment. It has been taken on Coronation, Warren and Forrester islands, a disconnected habitat that is as yet inexplicable. There are other islands along the western edge of the Alexander Archipelago on which no zoological collecting has been done, and such work, when it comes, may bring a better understanding of this variant.

I wish to express appreciation to the officials of the United States Biological Survey, of Field Museum, Chicago, and of the Museum of Vertebrate Zoology, University of California, for the privilege of bringing together the material upon which these comments are based.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THREE NEW UROTHRIPIDÆ FROM PANAMA.

BY J. DOUGLAS HOOD,
University of Rochester.

The types of the new species described below are in the author's collection.

Trachythrips deleoni, sp. nov.

Female.—Length about 1.1 mm. Color straw-yellow, with *head, prothorax, and mesothorax uniform dark brown*, extreme sides of metathorax and of first and ninth abdominal segments, as well as tip of tube, narrowly brown; remaining abdominal segments brown in lateral fourths or fifths, excepting for a paler area behind the middle of the blotches on segments 2 and 3 and a pale spot at the base of each major seta at the distal angles of segments 4-7; median portions of segments 3-8 with a pale brown cloud; legs with *fore femora white*, fore and hind tibiæ brown (darkest on outer surface) excepting for the pale ends; middle and hind femora and middle tibiæ narrowly dark brown along outer surface; all tarsi with cups brown; antennæ white in segments 1 and 2, shading through yellow in segment 3 and brownish yellow in 4 to light brown in 5; bright red subhypodermal pigmentation in head, prothorax, and along sides of abdomen.

Head scarcely 1.2 times as long as greatest width, pointed rather than truncate or emarginate in front, *not produced beyond eyes to form a bilobed process*, with the shallow *median dorsal furrow crossed by anastomosing lines which form distinct reticles posterior to the eyes, this furrow devoid of tubercles*. Eyes as in the genotype but with *the two caudo-mesad facets usually separated by a single setigerous tubercle*.

Male.—Smaller than female (length about 0.9 mm.), but otherwise similar.

Described from 46 mounted specimens, of which 11 are males, all taken at Porto Bello, Panamá, July 9 and 10, 1933, from dead leaves, branches, and standing herbaceous vegetation.

The italicized portions of the above description distinguish it readily from *T. watsoni* Hood, the genotype, and the two new species described below. It lacks the pronotal pale spot and the cephalic prolongation found in *T. frontalis* n. sp.; the white femora and the eye structure separate it

readily from *T. watsoni*; while the dark tibiae, less tuberculate head, and the presence usually of a single setigerous tubercle between the two inner posterior facets of the eyes serve to distinguish it from *T. albipes* n. sp. It is named after Señor Don Juan E. de Leon, Governor of the District of Portobelo, Panamá, to whom I am indebted for many courtesies.

***Trachythrips albipes*, sp. nov.**

Female.—Length about 1.1 mm. Color straw-yellow, with head, *prothorax*, and *mesothorax* uniform dark brown; extreme sides of metathorax and of ninth abdominal segment, as well as tip of tube, narrowly dark brown; remaining abdominal segments brown in lateral fourths, excepting for a paler area behind the middle of the blotches on segments 2 and 3 and a pale spot at the base of each major seta at the distal angles of segments 4–7; median portions of segments 3–9, with a light brown cloud at base, at least; legs of fore pair clear white, save only for the dark, blackish brown *coxae* and the paler brown tarsal cups; middle and hind femora and middle tibiae narrowly dark brown along outer surface; hind tibiae brown (darkest on outer surface) excepting for the pale ends; antennae nearly white in segments 1 and 2, shading through yellow in segment 3 and brownish yellow in 4 to light brown in 5; bright red subhypodermal pigmentation in head, prothorax, and along sides of abdomen.

Head somewhat more than 1.2 times as long as greatest width, *truncate* rather than *pointed* or *emarginate* in front, slightly produced beyond eyes but scarcely to form a bilobed process, with the median furrow very shallow, confined to space between the eyes and crossed by only a few anastomosing lines which scarcely form distinct reticles posterior to the eyes, the median region of head minutely tuberculate excepting for a brief space between the eyes. Eyes as in the genotype, but with the two caudo-mesad facets separated by two setigerous tubercles.

Male.—Smaller than female (length about 0.9 mm.), but otherwise similar.

Described from many mounted specimens, of which several are males, all taken on Barro Colorado Island, Canal Zone, Panama, July 29 and August 14, 1933, from dead branches.

Readily known from the other species of the genus by the italicized portions of the above description. The white fore femora and tibiae are quite distinctive, separating it at once from its congeners. It takes a natural position between the species described above as *T. deleoni* and *T. frontalis* described below.

***Trachythrips frontalis*, sp. nov.**

Female.—Length about 1.1 mm. Color straw-yellow, with head dark brown; *prothorax* dark brown excepting for a white crescent-shaped blotch involving the entire front margin of pronotum and the anterior third of its median length; *mesothorax*, adjoining portions and sides of metathorax, and sides of abdominal segments 1 and 9, as well as tip of tube, dark brown; remaining abdominal segments brown in lateral fourths, excepting for a

paler area behind the middle of the blotches on segments 2 and 3 and a pale spot at the base of each major seta at the distal angles of segments 4-7; median portions of segments 3-9 with a light brown cloud at base, at least; *legs of fore pair white, with dark brown coxæ, brown tarsal cups, and a lighter brown cloud occupying the second and third fifths of the tibiæ*; middle and hind femora and tibiæ dark brown along outer surface, the tibiæ frequently crossed by a light brown cloud, their tarsi with brown cups; antennæ pale yellow, darkening distally, with segment 4 brownish yellow and segment 5 yellowish brown; bright red subhypodermal pigmentation in head, prothorax (more abundant usually in the white pronotal blotch), and along sides of abdomen.

Head about 1.25 times as long as greatest width, *decidedly produced beyond eyes to form a broadened process which is usually distinctly bilobed or emarginate* (though occasionally only truncate); median dorsal furrow very shallow, crossed by many anastomosing lines which form distinct reticles posterior to the eyes, this furrow devoid of tubercles though margined with about ten setigerous ones on either side. Eyes as in the genotype, but with *the two caudo-mesad facets separated by two setigerous tubercles*.

Male.—Smaller than female (length about 0.9 mm.), but otherwise very similar; cephalic prolongation less distinct, broadly rounded rather than bilobed in front.

Described from a large number of mounted specimens, of which several are males, taken on Barro Colorado Island, and at Frijoles, both in the Canal Zone, and Chorrera, Panamá; July 6-August 13, 1933.

The frontal projection and pronotal pale spot are possessed by no other species of the genus. It is closer to *T. albipes*, described above, than to its other congeners.

